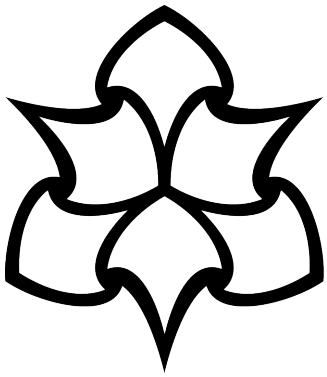

The Industrial Strategy Commission

The Final Report of the Industrial Strategy Commission

November 2017

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About The Industrial Strategy Commission

The Industrial Strategy Commission is an independent, authoritative inquiry into the development of a new, long-term industrial strategy for the UK.

The Industrial Strategy Commission is a joint initiative by Policy@Manchester at The University of Manchester and the Sheffield Political Economy Research Institute (SPERI) at the University of Sheffield.

The Commission was formally launched in March 2017. The Commission's first publication - a response to the government's consultation on their Green Paper on industrial strategy - was published in April 2017. Its first major report – *Laying the Foundations* – was published in July 2017.

Funders: The Industrial Strategy Commission has been supported by The University of Manchester and the University of Sheffield.

Acknowledgements

This report has been prepared by Kate Barker, Craig Berry, Diane Coyle, Richard Jones and Andy Westwood, with research support by Marianne Sensier. The report has been overseen and edited by Tom Hunt.

The Commission's work has benefited greatly from the contributions of a wide range of individuals and organisations who have engaged with the Commission, submitted evidence and attended our events.

Get in touch

For information or to contact The Industrial Strategy Commission, please email:

Tom Hunt: contact@industrialstrategycommission.org.uk

www.industrialstrategycommission.org.uk

The Final Report of the Industrial Strategy Commission

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Foreword

This Commission was established entirely independent of government, with the aim of bringing a fresh and robust perspective to the important task of framing the UK's new industrial strategy. This is now a crowded field, but by bringing a range of expertise and with the support of the evidence submitted to us, we believe we have introduced new and well-founded thinking.

Our emerging findings report, *Laying the Foundations*, stressed the importance of grasping this moment of opportunity, with a consensus in favour of a new approach across all political parties, the business community and stakeholders in central and local government. We argued there that the UK economy had a number of well-known weaknesses, and, along with the impending Brexit changes, they meant it was necessary to put aside past reservations about industrial strategy and take an open-minded approach to finding solutions.

Rather than the narrow flavour of industrial strategy, we propose that what is now needed is strategic economic management. Importantly this means a new understanding of the role of the state in the UK with a changed approach to its role as a regulator and in its procurement.

In this final report we set out the institutional foundations necessary for such a new approach; in particular the importance of strong Treasury co-ordination, the establishment of an independent Office for Strategic Economic Management to offer an impartial view on policies and monitor outcomes, and a greater degree of local autonomy, including some fiscal powers. There will be opposition to these reforms – but surely the problems of the past tell us that we need to seek for new approaches.

We suggest that at present policy should focus on outcomes in six strategic priorities; decarbonisation; infrastructure; sustainable health and social care; long-term investment; high-value and export industries, and enabling growth everywhere.

These are familiar issues, but it is less familiar to see these, rather than a set of sector deals, as the framing for an industrial strategy. The UK needs to have more ambition especially for tackling our major regional imbalances. One test of success for the approach we recommend is that in ten years' time the wellbeing of people and the resilience of local economies right across the UK should be improved.

Our work has made it clear that the UK's people, places and industries have great strengths and untapped potential. We are confident that a new industrial strategy built on the right foundations and with sound policymaking processes can enable that potential to be realised.

We must not find ourselves in the future debating yet again whether the UK needs an industrial strategy. Our aim is to ensure strategic economic management is seen as fundamental to the UK's success.

It has been a stimulating exercise, and a real pleasure for me to work with Diane Coyle, Richard Jones, Andy Westwood, Craig Berry and Marianne Sensier. Particular thanks are due to Tom Hunt, who has contributed much to our thinking as well as proving a fantastic organiser. In addition, we are all very grateful to everyone who has engaged with us by meeting or by submitting evidence.

Dame Kate Barker
Chair of The Industrial Strategy Commission

Executive summary

There is welcome and growing support for a new industrial strategy, but there is currently neither consensus nor clarity about what industrial strategy should entail or seek to achieve. This report aims to redress this situation. Our recommendations seek to shape the design of a strategy and steer it towards a policy framework that can ensure future success.

Strategic economic management: Industrial strategy must be rethought of as a broad and non-partisan commitment to strategic management of the economy. It is a long-term plan, with a positive vision, to build on the economy's many strengths and address its weaknesses.

New institutions are needed: Industrial strategy at the centre must be transformed. A new powerful industrial strategy division, within the Treasury, is needed to ensure all other departments devise and implement policies consistent with the industrial strategy.

Monitoring and measuring success: A new independent expert body should be created to monitor and measure the long-term success of the new strategy. On the model of the Office for Budgetary Responsibility, we propose the 'Office for Strategic Economic Management'.

Outcomes: The new strategy should have an ambition to achieve positive outcomes and make material differences to people's everyday lives.

Place matters: An industrial strategy should not try to do everything everywhere, but it should seek to do something for everywhere. In 5 or 10 years' time we should be able to pick anywhere in the UK and say how the strategy has helped that place, its people and industries.

Further and faster devolution: Most places perform below the UK average, given the extent of centralisation; new approaches are needed. The strategy requires further and faster devolution to towns, cities and regions.

Universal Basic Infrastructure: All citizens in all places should be provided with Universal Basic Infrastructure. Everywhere in the UK should be served by high quality hard infrastructure and have access to high quality human capital-building universal services.

Health and social care: Achieving better outcomes for people's wellbeing must be central to the strategy. New thinking can ensure health and social care aligns with industrial strategy.

Diffusion of innovation: World-class innovation happens in the UK but the effects should diffuse throughout the economy. We need to re-link excellence in basic and applied research.

New methods of appraisal: Decision-making for large strategic projects needs to be overhauled to better account for the potential impact on everyday behaviour. Cost-benefit analysis should apply to the real world, not just to a spreadsheet.

Choices: When there is a trade-off between economic efficiency and the equitable treatment of communities, sometimes it is right for the fairness objective to predominate.

A focus on the strategic goals of the state: The new strategy should be designed to meet the strategic goals of the UK. Our assessment is that these goals in 2017 are:

- Ensuring adequate investment in infrastructure
- Decarbonisation of the energy economy
- Developing a sustainable health and social care system.
- Unlocking long-term investment
- Supporting high-value industries and building export capacity
- Enabling growth in all parts of the UK

1. Rethinking industrial strategy

The UK economy has historic weaknesses, yet the UK's people, places and industries have great strengths and huge potential. To both respond to current weaknesses, made more pressing due to Brexit-related uncertainty, and build on our strengths we need strategic co-ordination of all economic interactions between the state and the private sector. The new industrial strategy will only be successful if industrial strategy is thought about in completely new terms and if it is focused on clear goals. We recommend a focus on six strategic goals and the report considers how to meet each of them.

- Industrial strategy should be understood as a broad and non-partisan commitment to strategic management of the economy.
- The UK economy has many strengths and areas of opportunity, but the reality must be accepted that it also contains many sustained weaknesses. The government should commit to addressing all of the weaknesses through strategic economic management.
- The new industrial strategy must be designed with a comprehensive understanding of the state's unique powers of coordination and convening, and its ability to pool risk, create markets and provide public goods.
- Comprising a long-term and viable industrial policy framework, the strategy should be built on seven foundational themes: a new institutional framework; place; science, research and innovation; competition policy; investment; skills and the state's regulating and purchasing power.
- The UK needs significant cultural change in policymaking so that the new industrial strategy does not become paralysed by risk aversion and short-termism.
- The new industrial strategy should embrace technological change and seek to capture the benefits, but a critical perspective to occasionally overstated claims is always necessary. It should recognise the state's essential role in driving technological innovation, and focus on diffusion, as much as disruption.
- A new strategy should have an ambition to achieve positive outcomes and make material differences to people's everyday lives, and not confine itself to a few 'sector deals'. Our assessment is that the strategic goals for the UK in 2017 and for the foreseeable future are:
  - Ensuring adequate investment in infrastructure
  - Decarbonisation of the energy economy
  - Developing a sustainable health and social care system.
  - Unlocking long-term investment
  - Supporting high-value industries and building export capacity
  - Enabling growth in all parts of the UK

2. Institutional framework and delivery mechanisms

Institutional reforms are needed to ensure there is vision, impetus and co-ordination of industrial policies, but once the strategy is established there should be as much long-term policy and institutional stability as is politically possible. The new industrial strategy must be owned by and driven from the top of government, including the Prime Minister and the Treasury. It must be embedded throughout the state with institutional clarity in Whitehall and powers devolved to local, regional and devolved government wherever possible. The new strategy must pay particularly close attention to the operation of key industrial policy delivery mechanisms such as skills provision and the research and innovation landscape.

- A new industrial strategy division should be created within the Treasury, overseen by the Chief Secretary, with the power to ensure that all other departments devise and implement policies consistent with the industrial strategy. The existing structure of the Treasury must change to reflect a new approach to industrial strategy. BEIS should be retained as a key delivery department. Officials from several departments, including BEIS, the Cabinet Office and 10 Downing Street, along with local, regional and devolved authorities would be directly involved in the day-to-day work of the new division.

- Central government should devolve a significant array of powers and budgets related to industrial policy to sub-national political authorities, including those related to infrastructure, skills, business finance, planning and procurement, and some tax powers. Existing city-region and combined authority structures should be the basis for this programme of further and faster devolution, but other models should also be permitted where there is a strong consensus locally, including multi-tiered devolution whereby multiple city-regions establish a unified structure through which some powers can be exercised cross-regionally.

- Local Enterprise Partnership (LEP) boundaries should coincide with the appropriate economic geography. For the most part LEPS should be retained, albeit with greater attention to how they can support strategic economic management over the long-term.

- The government should create an independent mechanism for monitoring and assessing progress in the industrial strategy. On the model of the Office for Budgetary Responsibility, we suggest calling it the 'Office for Strategic Economic Management'. This would signal that industrial policy is as important as fiscal policy. The title would enable it to act broadly across government and specifically to draw in Treasury interests in areas that might otherwise be considered out of scope.

- Skills policy requires institutional and policy stability after decades of damaging instability. Cross-party consensus on supporting the framework adopted in the coming years will be critical to its success. To deliver both local and national industrial strategy objectives, closer working and co-operation is required between the Department for Education and BEIS, national and local authorities, and the higher and further education funding and regulatory systems.

- Particular attention should be given to how spatial objectives in the industrial strategy are built into current and planned higher education reforms including the introduction of the Office for Students and the Teaching Excellence Framework. In general, more skills resources and powers (within stable national funding and curriculum systems) should be devolved to metro-mayors and combined authorities.

- A long-term commitment to raise the R&D intensity of the economy, measured as the ratio of R&D spend, should be accompanied by a more detailed understanding of the whole innovation system and the channels through which spending is translated into meaningful innovation. This will require intermediate milestones for both business and government/HE R&D intensity, supported by proposals for concrete interventions at a material scale, and with a new emphasis on *demand-led* initiatives to supplement the supply-side approach characteristic of the last 15 years of science and innovation policy.

- The new UK Research and Innovation agency (UKRI) should inform, and be informed by, the proposed new industrial strategy division in HM Treasury. It is essential that there is a cross-government mechanism that has a two-way relationship with UKRI. The UKRI board should have a high-level advisory committee including representatives from all three Devolved Administrations, and from key local authorities with devolution deals.
- The UK should seek to maintain and enhance the international character of its research system, including through future participation in EU Framework Programmes, for example through associate country status.
- The new strategy should be designed with a comprehensive understanding of the whole R&D landscape and the relationships between its different parts. New institutions must have clarity of mission and be judged by the appropriate metrics.

3. Investing in Infrastructure

Ensuring there is adequate investment in infrastructure to meet our current and future needs and priorities is one of the immediate strategic priorities for the industrial strategy. Achieving excellence among our most productive companies and in our most dynamic places, and to ensure the benefits of a successful economy are shared fairly, will require increased investment in both hard (physical and natural capital) and soft (human capital-building) infrastructure. The UK needs new appraisal methods for infrastructure investment and a more devolved relationship between central government and sub-national decision makers.

- The new industrial strategy should commit to providing Universal Basic Infrastructure for all citizens in all places. Everywhere in the UK should be served by high quality hard infrastructure and have access to high quality human capital-building universal services.
- The UK should commit to a higher level of infrastructure spending. There should be more direct investment by the government, but also newer sources of finance. In particular we believe the regulated asset base (RAB) approach to utilities, should be more widely used.
- The UK should establish a public infrastructure bank which could crowd in private investment through a government guarantee and provide significant support for long-term investment through reinvesting all its profits.
- There is a strong case for more devolution of both decision-making and fiscal powers. We recommend the introduction of limited borrowing powers for local and regional authorities and limited local tax powers.
- Infrastructure appraisal methods and practice for strategic projects should take account of potentially large changes in behaviour. In particular, the agglomeration effects and regional distribution of spending must be taken properly into account. There should also be more evaluation of big projects after they have been in operation for a time, to inform future appraisals.
- The regulatory framework for privatised utilities needs reform. Consideration should be given to replacing the sector regulators for the network industries with a single body, sitting within the Competition and Markets Authority (CMA), with a remit to include investment incentives in its criteria for regulation. Sectors need to be regulated more consistently.

4. Decarbonisation of the energy economy

A key element of industrial strategy must involve supplying an effective energy infrastructure, for the generation of electricity, and the distribution of electricity and gas. The pressure of climate change means we must urgently decarbonise our energy supply. The energy transition we need to make to an affordable, low carbon future is enormously challenging, yet offers huge opportunities for UK industry to develop innovative new products and services.

- The government should seize the opportunity arising from the merger of the Departments of Energy and Climate Change and Business, Innovation and Skills to fully integrate energy policy into a new industrial strategy under the auspices of the Department of Business, Energy, and Industrial Strategy.
- The UK's energy R&D capacity must be increased. This will require the government take a much more active role in making sure this research takes place and that UK industry benefits from it. Particular attention should be given to building and strengthening R&D institutions that have a focus on scale-up and translational research.
- Achieving a 100 per cent low carbon electricity system will require investment in new energy storage technologies and better demand management. Carbon capture and storage (CCS) offers significant potential and the government should commit to invest in the necessary infrastructures for CCS technologies to be fully utilised and provide financial incentives to make them viable.
- The government should consider taking a significant equity stake in future nuclear new build projects, and should develop the supply chains for the UK nuclear industry to ensure that UK business is able to supply a higher proportion of the highest value components of new nuclear build.
- The government should undertake a review of environmental taxation and regulation to assess how effectively these are properly pricing externalities and incentivising innovation around sustainability through the whole product life-cycle. We suggest this would be an appropriate commission for the government to give to the new Office for Strategic Economic Management that we propose.

5. Health and social care at the centre of industrial strategy

Ensuring there is an effective, efficient and financially viable health and social care system, in the context of an ageing demography, is a key strategic goal for the UK. The new strategy must incorporate social care, public health, the NHS (as a market as well as a service), and the UK's strong industrial sectors in pharma/life sciences and medical technology, as one whole system.

- Health and social care should be integral to the new industrial strategy. This should aim to use the state's purchasing power to promote innovation in a way that creates new value in the pharmaceutical, biotech and medical technology industries; raise the direct productivity of the health and social care sector, and ultimately achieve better health outcomes in a financially sustainable way.
- Future increases in public spending on health should come with the strict expectation that investment should be used to raise productivity. The provision of health and social care in all places means that even small productivity increases could have a significant impact.
- The new independent Office for Strategic Economic Management should consider the delivery of publicly funded health and social care a key priority area for assessment.

- There should be a rethink of procurement for both health and social care, with the aims of improving purchasing practice in the short-term to accelerate the adoption of new technologies and of looking for ways to stimulate innovation especially in domiciliary social care which will reduce the risk of spiralling costs as the population ages. Successful programmes for demand-led innovation, such as SBRI Healthcare, should be expanded and emulated.
- The new industrial strategy should aim to achieve higher productivity and better health outcomes by ensuring more skilled and satisfying jobs in the health and social care sector. An urgent focus on redesigning training and education should aim to both raise the skills of existing employees and attract new people to the sector.
- Health and social care services should be integrated, but this should be steered by the goal of achieving better outcomes for people's wellbeing and not purely by reducing costs. This will lead to savings but not on a sufficient scale to meet the spending pressures of an ageing population. Lessons must be learned from the places which are now experimenting with health and social care integration to build the evidence base for how to achieve better outcomes.

6. Unlocking long-term investment

Compared to other leading economies the UK's investment rate is below average and there is an urgent need for more long-term investment. Ensuring that there is a plentiful and appropriate supply of capital to the most (potentially) productive economic activities should be part of the strategic management of the economy.

- To support industrial strategy objectives, the government should recognise that public investment is indispensable - part of the solution to the UK's economic predicament, not part of the problem. The government should therefore, firstly, adopt criteria for public investment which better recognise its crowding-in effects. Infrastructure, public services and early-stage technological development are clear priorities.
- Commitment to public investment should go hand-in-hand with new local and national institutional mechanisms for investment, bringing greater coherence and stability to investment funds currently available, and ensuring they are aligned with overall industrial strategy objectives.
- We strongly encourage HM Treasury to ensure that the recommendations of the Patient Capital Review are aligned with overall industrial strategy objectives. We welcome the apparent commitment not to extend tax reliefs to venture capital, but would urge the government to go further by reforming these reliefs so that they support riskier, early-stage innovations throughout the whole of the UK – and indeed to redirect the relevant budgets towards direct investment. We also encourage greater consideration of the relationship between pensions provision, regulation and long-term investment.
- The government should commission new research, and pilot studies, into the possibility of a) extending private bank finance for innovation, through schemes such as intellectual property-backed lending, and b) expanding the role of public investment banks (albeit independent of any direct government control) especially where particular industrial and/or place-based needs can be demonstrated which align with strategic economic objectives.

- The government's proposals around corporate governance should be revised in line with industrial strategy objectives, and evidence on the relationships between company forms and long-term value-creation. The UK's corporate governance regime does not prioritise long-term investment over short-term income. There is no consensus on how best to achieve this but we suggest solutions will include greater employee engagement, collaborative and cumulative learning within firms, and prohibiting quarterly financial reporting.

7. Supporting high-value industries and building export capacity

Meeting challenges that transcend industrial categories – such as decarbonisation and population ageing – will require the development of high-value industries and so this must be core to the new strategy. High-value industries that are built on the UK's specialisms are key to increasing the UK's export capacity which in turn will help to raise productivity.

- The new industrial strategy should seek to significantly increase the UK's export capacity. It should strengthen existing mechanisms for export, focusing on incentivising challenger firms in high-value industries, rather than simply supporting incumbents. Improving productivity also requires that UK firms are both disciplined by overseas competition, and able to fully participate in international supply chains through which technological progress is disseminated.
- Competition policy must form a central part of a new industrial strategy and seek to support excellence in high-value industries where the UK has a (potential) comparative advantage. Competition policy needs to be considered with a more strategic long-term approach bringing together competition, merger, regulatory and consumer policies under the strategic direction of the Competition and Markets Authority (CMA). A priority Brexit-related task for the CMA is to implement its own state aid policy outside the EU. All sector-focused regulatory bodies (excluding the media and financial services' regulators) should be replaced with a horizontal regulator.
- The new industrial strategy must encompass a serious commitment to business support, with advice focused on enabling firms in high-value industries to emerge and grow – and shaped by overarching industrial strategy objectives. Business support should be joined-up with other services, such as innovation and export finance. There will clearly be a need for better co-ordination between national and local services and institutions: the new Office for Strategic Economic Management should certainly consider how to rationalise the policy and delivery landscape, based on evidence of best practice internationally.

8. Enabling growth everywhere

The performance of the UK economy is held back by our high degree of regional imbalance. It is right that the new strategy should seek to improve this imbalance. An industrial strategy should not seek to do everything everywhere, but it should seek to do something for everywhere. There should be nowhere where industrial strategy makes no impact at all, even if the requirement to focus means that some places receive more attention than others. Policymakers must acknowledge the trade-off between economic efficiency and the equitable treatment of communities. Sometimes, in these cases, it is right that decisions are made where the fairness objective predominates.

- Industrial strategy should seek to help all underperforming areas. In 5 or 10 years' time we should be able to pick any place in the UK and demonstrate how the industrial strategy has helped that place, its people and industries.
- The new Office for Strategic Economic Management should have an explicit mandate to monitor the health of local and regional economies, supported by improved data and statistics at regional and sub-regional level.

9. The Office for Strategic Economic Management

It is crucial that the new industrial policy framework is monitored and measured effectively, and that the UK develops a policy culture and capacity to understand and use the subsequent data appropriately. Strategic management of the economy and meeting the goals of the state is a long-term endeavour. It is essential policy interventions are monitored over the long-term to ensure progress is being made and maintained.

- The new Office for Strategic Economic Management should focus on evaluating government policy over the long-term, and on analysing the economic environment in which industrial strategy operates. It would provide independent advice to government and carry out specific commissions on behalf of government.
- The first key task of the new Office would be to develop and agree the metrics that it will monitor. Metrics should be designed by considering economic data that relate to meeting the strategic goals of the state.
- The new Office should publish in-depth analysis of the industrial strategy on a four or five-year basis and only once within a parliament. It should provide a summary assessment of its key overarching indicators on an annual basis, and report this to Parliament and the devolved national assemblies.
- To effectively monitor and measure the new strategy improved sub-national economic data is required. The new Office should work with the relevant data-producing national organisations, and local and regional institutions to agree metrics at the appropriate spatial and sectoral levels.
- New sub-national economic indicators should give consideration to measuring the resilience of local and regional economies.

Introduction

This is a report about the long-term future of the UK economy. It is not about individual sectors, places or policies, but takes a broad view of how a new industrial strategy for the UK can help to achieve resilient economic development and enable the economy to deliver prosperity in the public interest.

Over the course of 2017 the Industrial Strategy Commission has taken evidence from a wide range of business, policymakers and members of the public and we have had extensive engagement with key stakeholders. Our work leaves us in no doubt that there is enormous potential for a new industrial strategy to build on the many areas of strength within the economy and achieve outcomes that can make a material difference to people's lives in all parts of the UK.

However, this is not predestined. The UK faces significant challenges and our economy has serious weaknesses. Those manifest weaknesses have resulted in 70 per cent of regions in the UK being poorer than the EU average. As well as an evolving global context where protectionism is returning, and continuing technological change, the UK also faces Brexit-related uncertainty and transition costs weighing down on growth and living standards for the next decade. Already, many people have experienced no improvement in living standards in the decade since the financial crisis, the longest period of stagnation in real incomes since the mid-19th century, a stagnation which directly reflects a pronounced slow-down in productivity growth.

Against this background, it is clear that now more than ever the UK requires strategic economic management - and this is what we mean by industrial strategy. Long-term strategic management of the economy can enable the UK to make the necessary investments in our people, places and industries to prosper and to respond to current challenges.

Therefore we strongly welcome this government's commitment to develop an industrial strategy. Importantly, there is strong cross-party political consensus for a new strategy, and emerging support from business and the public. But despite this there is currently neither consensus nor clarity about what industrial strategy should entail or seek to achieve, or even about what industrial strategy is. Addressing this was the urgent task that we set ourselves.

We therefore publish this, our final report, at a critical moment for the development of a new industrial strategy. If the strategy is not designed and thought about correctly from the outset it will not achieve its potential. In our first report *Laying the Foundations* we set out our view that industrial strategy encompasses the strategic co-ordination of all economic interactions between the state and the private sector. This, our final report, develops this in much greater detail but stands alone from the first report.

Industrial strategy is not a 'theory of everything', but strategic economic management does by definition require an overview of the economy as a whole. It should be informed by a positive vision of a future destination for our country, and motivated by an urgent sense of national purpose. It must be guided by lessons learnt from the past, sound analysis of current problems and how to address them, and by anticipating and preparing for the future.

This report makes a series of recommendations and they start at the centre of the state. To be successful a new strategy will need clear political leadership from the top of government. Rethinking how industrial policy operates from the centre is as important as the specific policies that will make up a new strategy. Industrial strategy must be embedded throughout the state with cross-government institutional structures, decision-making processes and methodologies overhauled.

Unless a new industrial strategy is embraced across the state, with institutional clarity in Whitehall and in regional and devolved government, it will not be able to respond to the major weaknesses of the economy and tackle the strategic challenges facing the UK. Challenges such as climate change and an ageing population affect all people, places and industries – they require whole-state responses.

It is big long-term strategic challenges of this kind that an industrial strategy should focus on and be organised around. Reframing the challenges that the UK faces as strategic goals to be met can both provide a positive and aspirational vision for the UK and make material differences to people's everyday lives. Our assessment is that the strategic goals for the UK in 2017 and for the foreseeable future are:

- Decarbonisation of the energy economy
- Ensuring adequate investment in infrastructure
- Developing a sustainable health and social care system.
- Unlocking long-term investment
- Supporting high-value industries and building export capacity
- Enabling growth in all parts of the UK

This report outlines our views and recommendations on how these goals can begin to be met. We are under no illusions: the challenges are large, but so too are the potential rewards. Unless an industrial strategy is ambitious it will not achieve, secure and maintain the consensus it needs to endure over the long-term. Citizens must be able to see why industrial strategy matters to their lives now and in the future, politicians must be able to explain confidently why industrial strategy matters to their constituents and business must be able to see how industrial strategy helps them and how they fit into it.

The recommendations we make introduce fresh thinking in particular around new institutional structures, the need for increased investment and crucially, on the importance of place. A new industrial strategy should not seek to do everything everywhere but it can and should offer something for everyone everywhere. Central to our thinking around place is our proposal for a Universal Basic Infrastructure commitment, including both hard (physical and natural capital) and soft (human capital-building) infrastructure, to boost the productive capacity of all people and places. We also call for further and faster devolution from the centre to our towns, cities and regions. Most places in the UK perform below the average and new approaches are needed. Significant devolution of delivery, policymaking and budgetary powers will enable places to develop solutions that are tailored to their needs and build on distinctive local specialisms, but all within an overall national industrial strategy framework.

A further theme running through our report and one that must be central to a new industrial strategy is diffusion. The UK's innovation system must re-link excellence in basic and applied research; and ensure that the innovation in the high-skilled, high-productivity parts of our economy diffuses to the places and sectors currently stuck in a low-skill, low-productivity equilibrium.

This will necessarily take time and so it is critical that a new industrial strategy – its policies and the monitoring of them - is long-term, and our recommendations are made accordingly. They are not all fine-grained but collectively they seek to shape the design of a strategy and steer it towards the correct policy framework. We do not have all of the detailed policy answers for how to make a new strategy successful nor should we. Good policy is made by learning from experience. Over the coming years and decades we will need experimentation, trials and evaluation. This requires a change of culture in policymaking as new ideas and policies always entail a degree of risk. There has to be some acceptance of failures, an understanding that opportunities have costs, and decision-making that allows benefits to accrue over the long run rather than always going for short-term gains.

The forthcoming government White Paper should be considered as a step towards designing a new industrial strategy, not the definitive last step. We hope this report and our recommendations will also be seen in the same way.

1. Rethinking industrial strategy

Industrial strategy is a broad and non-partisan commitment to strategic management of the economy. Although the UK has had many industrial policies over the decades, there has been little strategic intent or serious scale, and there has been no long-term commitment to a policy framework that would embed the pursuit of higher productivity and higher incomes. This must now change.

Chapter One firstly presents the weaknesses of the economy and the scale of the challenge. It then considers why the UK has not had the strategic perspective we need, before outlining the foundations and vision for a new strategy.

1.1. Strategic management of the UK economy

The failure to strategically manage the UK economy reflects the prevailing aversion amongst many UK policymakers to active industrial policy since the Thatcher government's abolition of the National Economic Development Office in 1982. This aversion was informed by the largely unsuccessful support for some declining industries in the 1970s, and by a strong academic critique of 'government failure'. This will no doubt continue to be the response in some quarters now. After all, poor government implementation of policies is a genuine concern, not least as it may reflect capacity gaps among the cadres of politicians and officials who are trained for analysis but not implementation.

The academic consensus on industrial strategy has shifted substantially since the heyday of free market economics among economists in the 1980s and 1990s – although, as Professor Martin Chick has pointed out, that period itself reflected a changing tide of academic opinion compared with the 1960s and 1970s.[1] Research on the experience of other countries – particularly the spectacular success of East Asian economies – has also contributed to the latest shift in judgement about the capacity of the market to deliver productivity and growth, but above all there is now increased understanding of the importance of institutions, long-term planning and agglomeration in explaining economic growth performance. Many leading economists now advocate a change of tack. '*Make no mistake, Britain needs an industrial policy*' writes Professor Dieter Helm.[2] We also welcome the recognition from across the political spectrum that a fresh approach towards industrial strategy is needed.

Recommendation: Industrial strategy should be understood as a broad and non-partisan commitment to strategic management of the economy.

The weaknesses of the UK economy

This shift in thinking has occurred in no small part due to an increasing recognition that whilst the UK economy undoubtedly has great strengths, it also has major weaknesses. Our analysis and the evidence we have received leads us to identify the following fundamental and interconnected weaknesses in the economy:

1 Chick, M. (2017) 'Industrial policy in Britain since 1970: changing values, assumptions and mechanisms', J*ahrbuch für Wirtschaftsgeschichte*, 58(1), 35-57.

2 Helm, D. (2017) 'Policy by lists – the Green Paper and the new industrial strategy' http://www.dieterhelm.co.uk/regulation/regulation/policy-by-lists-the-green-paper-and-the-new-industrial-strategy

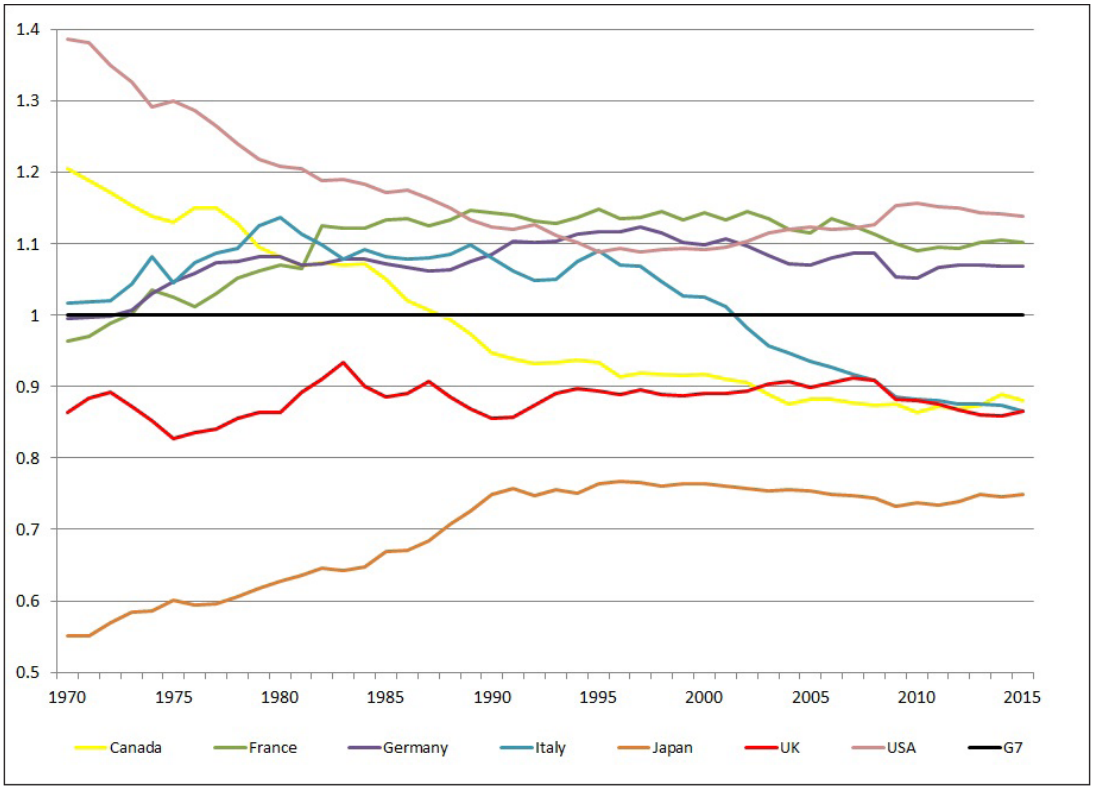
- Poor productivity performance
- Pronounced regional differences in economic performance
- A highly centralised economy
- A low rate of investment
- Uneven skills distribution
- Weakening diffusion of innovation
- Weak trading performance and a changing trade landscape
- A low research and development (R&D) intensity

These weaknesses and related challenges are the starting point and context for a new industrial strategy.

Poor productivity performance

Productivity growth is essential for rising living standards and a sustainable fiscal situation. Yet over the long-term UK productivity has underperformed relative to other advanced economies. UK productivity in 2015 was 16 per cent lower than the G7 average.[3] The UK has also experienced a more pronounced slow-down in productivity growth than most other OECD economies in the decade since the financial crisis.

Figure 1.1: G7 labour productivity levels relative to the G7 Average[4]



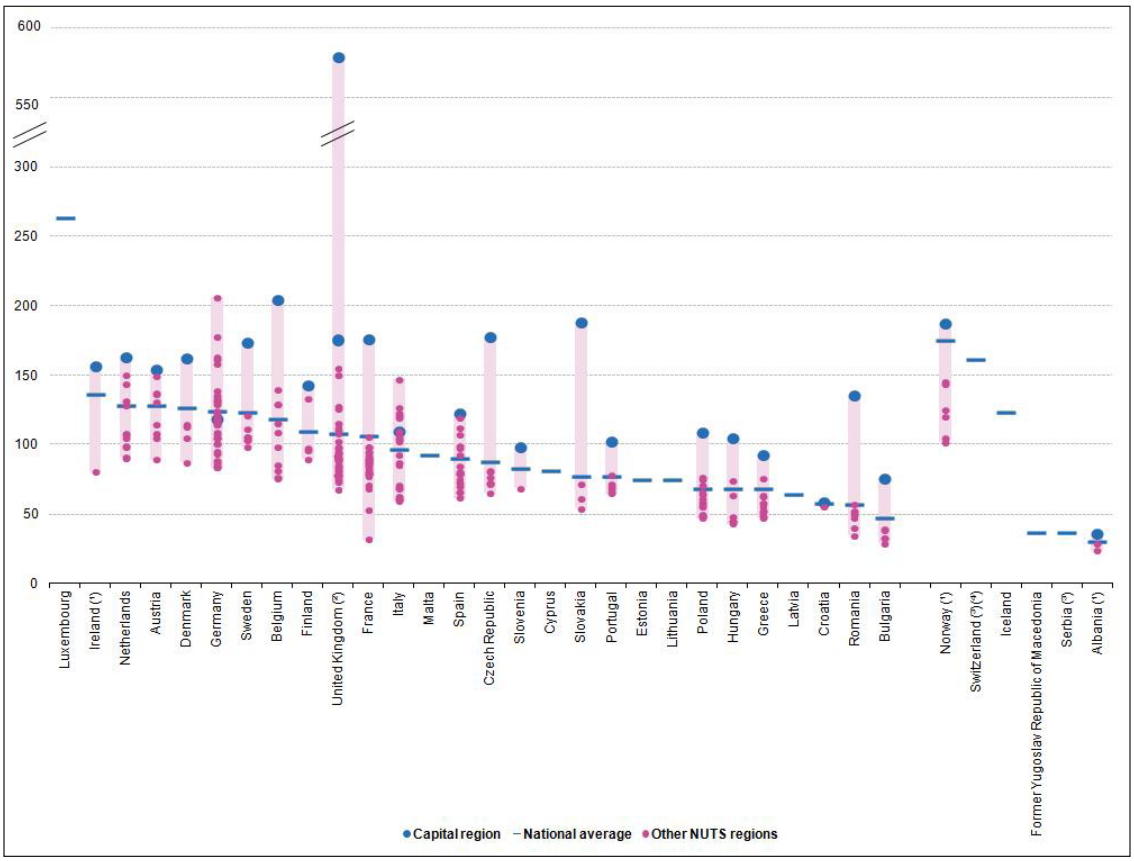
3 Office for National Statistics (2017) *International comparisons of UK productivity (ICP), final estimates: 2015* https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/bulletins/internationalcomparisonsofproductivityfinalestimates/2015

4 Data from OECD (2017) *GDP per hour worked* https://data.oecd.org/lprdty/gdp-per-hour-worked.htm

Pronounced regional differences in economic outcomes

The UK is by far the most geographically unequal EU economy with pronounced differences in economic outcomes between and within regions and cities. Most core cities outside London have productivity lower than the national average. Many de-industrialised areas, often on the fringes of city-regions, present apparently intractable combinations of social, educational and economic problems, while some of the most deprived communities are to be found on the coasts and in rural peripheries. The highest level of GDP per capita in the EU is found in inner West London[5], yet many people in the capital have low incomes and live in areas of high deprivation.

Figure 1.2: GDP per inhabitant in purchasing power standards (PPS) in relation to the EU-28 average, by NUTS 2 regions, 2015 (% of the EU-28 average, EU-28 = 100)[6]



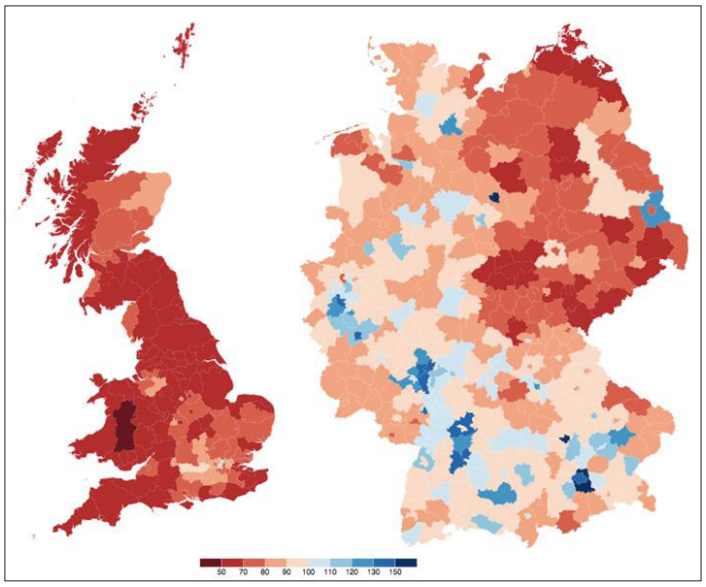
A highly centralised economy

Most economies have a small number of very large, dense and highly productive city-regions. The UK only has one, London. New analysis by the Centre for Economic Performance, shown in Figure 1.3, illustrates this point through a comparison of the UK with Germany. Not having a second or third large urban region leads to high congestion costs in the capital, draws highly productive activity and jobs from elsewhere in the UK to London, and requires policy actions to be taken to prevent overheating earlier than would be desirable for other regions.

5 Eurostat (2017) *GDP at regional level* http://ec.europa.eu/eurostat/statistics-explained/index.php/GDP_at_regional_level#Regional_GDP_per_capita

6 Figure 1.2 reproduced from Eurostat (2017) *GDP at regional level* http://ec.europa.eu/eurostat/statistics-explained/index.php/GDP_at_regional_level

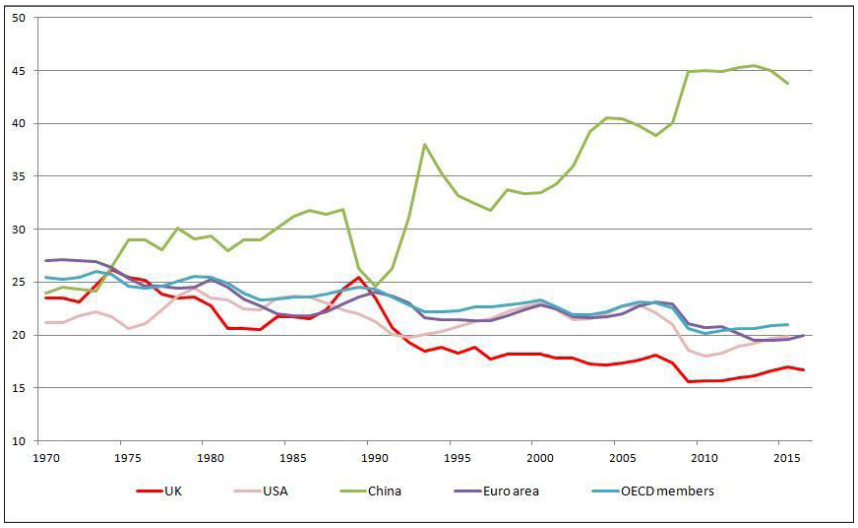
Figure 1.3: GVA per hour at NUTS 3 region level in 2014, with Germany's overall productivity set to 100[7]



A low rate of investment

The UK has a low investment rate, with business investment lower than in most other G7 countries. The UK's capital allocation mechanisms, in the context of a global financial system, are widely recognised as failing to enable industrial development by not providing enough patient capital investment. This has long been acknowledged as a weakness of the UK economy, as evidenced by frequent government reviews of the UK's investment landscape, including the recent Patient Capital Review.[8]

Figure 1.4: Gross fixed capital formation as a percentage of GDP, 1970-2016[9]



7 Figure 1.3 reproduced from Bernick, S., Davies, R., and Valero, A. (2017) 'Industry in Britain – An Atlas', *Centre for Economic Performance Special Paper No.34* http://cep.lse.ac.uk/pubs/download/special/cepsp34.pdf

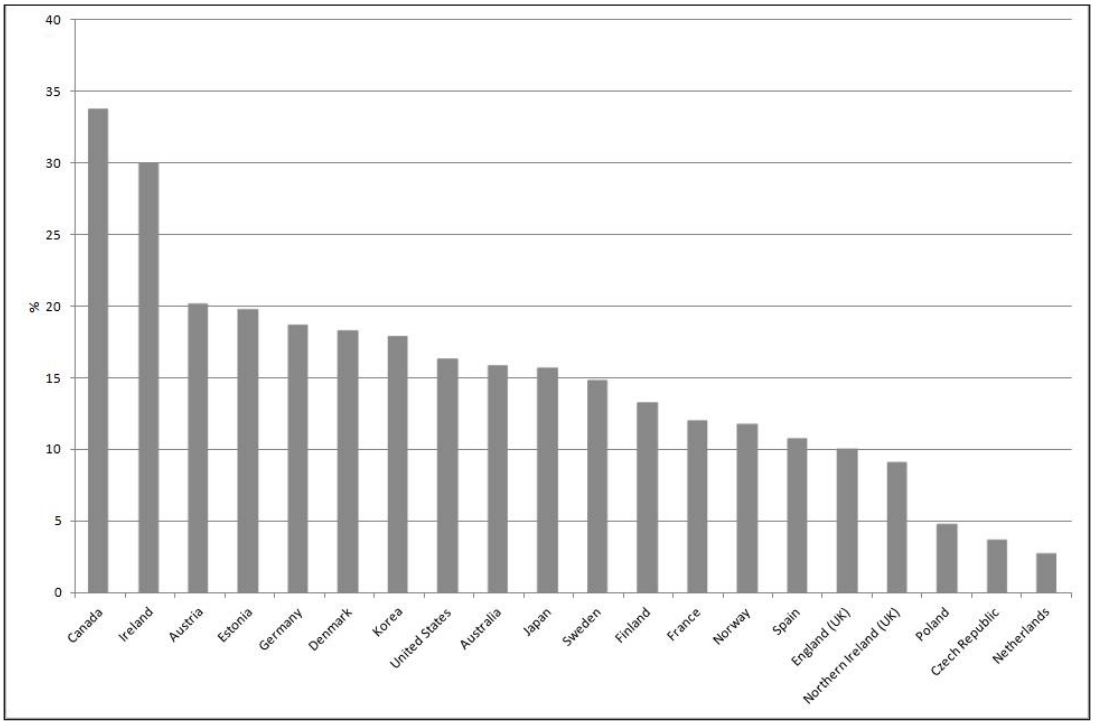
8 Most recently, the Myners Review of Institutional Investment (2001); the Kay Review of UK Equity Markets and Long-Term Decision Making (2012); the Patient Capital Review (2017).

9 Gross fixed capital formation data from the World Bank https://data.worldbank.org/indicator/NE.GDI.FTOT.ZS

Uneven skills distribution

The UK economy suffers from a highly uneven skills distribution amongst the population, and a mismatch between skills supply and employment demand. A relatively high proportion of the population has low or no qualifications. OECD data (see Figure 1.5) shows that only 10 per cent of 20-45 year olds hold a technical qualification as their highest, placing the England 16th out of 20 OECD countries.[10] By 2020, the UK is set to fall to 28th out of 32 OECD countries for intermediate skills.[11]

Figure 1.5: Professional education and training qualifications in the labour force (percentage of adults aged 20-45 who have short-cycle (below degree-level) professional education and training as their highest qualification)[12]



10 OECD (2014) *Skills Beyond School Synthesis Report* https://www.oecd.org/edu/skills-beyond-school/Skills-Beyond-School-Synthesis-Report.pdf

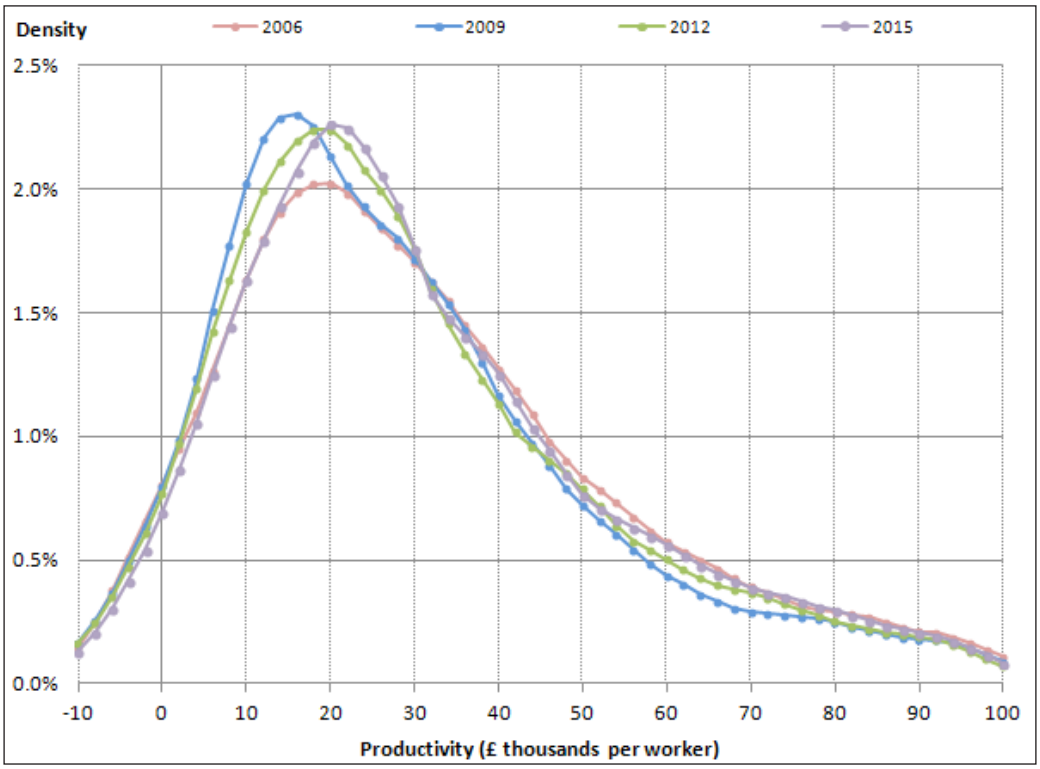
11 The UK Commission for Employment and Skills 2015 provides an assessment of current and future trends in the UK's skill profile compared to OECD member states https://www.gov.uk/government/publications/uk-skills-levels-and-international-competitiveness-2014

12 Figure 1.5 is reproduced from OECD (2014) Skills Beyond School Synthesis Report https://www.oecd.org/edu/skills-beyond-school/Skills-Beyond-School-Synthesis-Report.pdf The figure presents data from the OECD's 2012 Survey of Adult Skills.

Weakening diffusion of innovation

Across advanced economies the mechanisms for diffusing innovative new technologies, skills and business practices throughout the economy are weakening, manifested as a growing divide at the firm level between internationally competitive companies at the technological frontier, and underperforming firms.[13] Figure 1.6 demonstrates the UK's small number of high productivity firms (and how this is unchanged from before the 2008 financial crisis). Related to this are concerns about the poor quality of management in some UK firms.[14] The UK has higher proportion of underperforming firms than other OECD states.[15] Poor management practices lower productivity and economic returns, and are most pronounced where competition is weak and corporate governance sub-optimal.[16]

Figure 1.6: UK distribution of firm level GVA per worker in constant prices[17]



13 OECD (2015) *The Future of Productivity* http://www.oecd.org/economy/the-future-of-productivity.htm

14 Bloom N and Van Reenen, J (2007) 'Measuring and explaining management practices across firms and countries', *Quarterly Journal of Economics*, Vol CXXII (4).

15 Productivity Leadership Group (2016) *How good is your business really? Raising our ambitions for business performance* https://www.bethebusiness.com/wp-content/uploads/2017/09/how-good-is-your-business-really.pdf

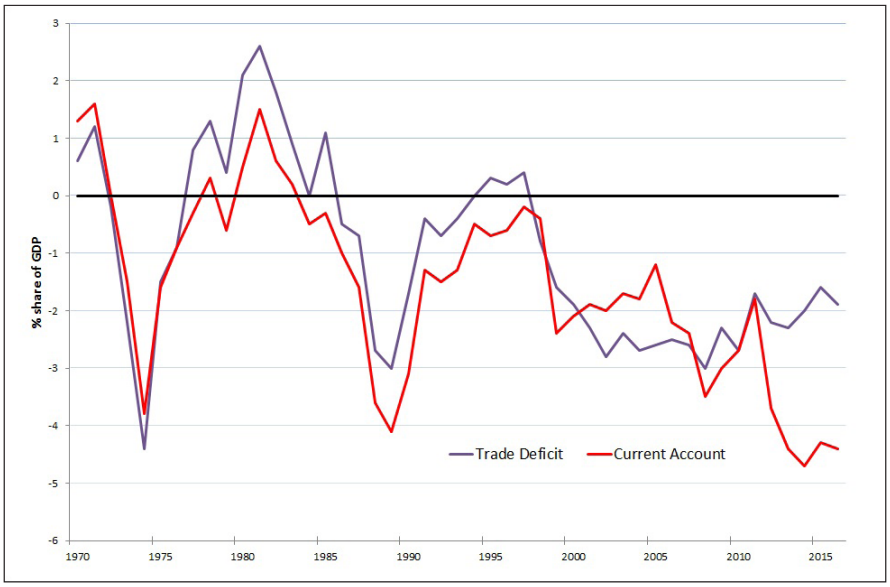
16 Driver C. and Temple, P. (2014) *The Unbalanced Economy: a policy appraisal*. Basingstoke: Palgrave Macmillan.

17 Figure reproduced from ONS (2017) *UK productivity introduction: Oct to Dec 2016* https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/ukproductivityintroduction/octtodec2016

Weak trading performance and a changing trade landscape

Trade resulting from international specialisation is a fundamental engine of economic growth and rising living standards. Yet on most measures the UK's trading performance is weak. The current account balance is in deficit and has deteriorated in recent years. There is a large and persistent trade deficit. This weak trading performance is now in the context of great uncertainty about the UK's future trade relationship with the EU, its major trade partner, and a highly uncertain global trade landscape where the language of protectionism and economic nationalism has returned.

Figure 1.7: UK Current Account and Trade Deficit as a percentage of GDP, 1970-2016[18]



Low R&D intensity

The UK's research and development (R&D) intensity – or equally its gross expenditure on R&D – has been declining since the 1980s, whilst spending in other large developed economies such as the USA, France and Germany has increased. Meanwhile in fast developing East Asian states R&D intensity has increased very rapidly, with Korea surpassing the UK in the early 1990s and China in 2009. Currently the UK's R&D intensity is about 1.7 per cent of GDP, compared to an OECD average of 2.4 per cent. Both public and private R&D is weak and the UK underperforms in private sector R&D compared to other large developed economies.[19] There is a strong positive correlation between the level of public and private sector R&D and total factor productivity growth, through both direct effects and wider spillovers.[20] Furthermore, R&D is highly regionally polarised, with 38 per cent conducted in the South East and East of England.[21]

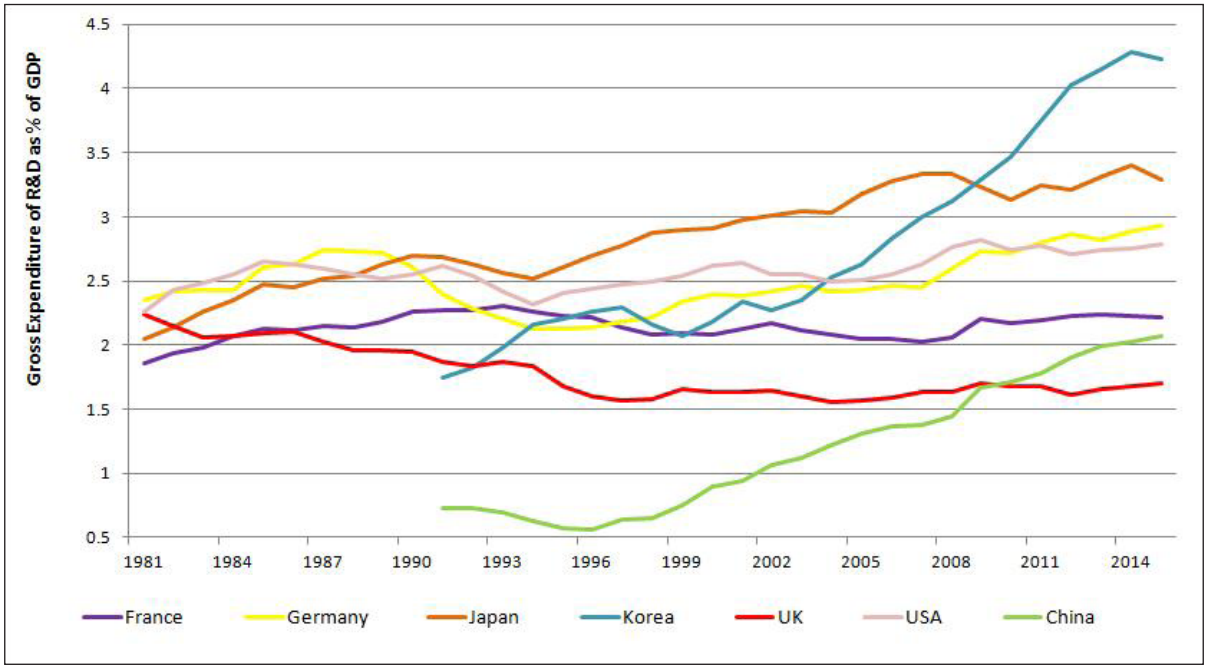
18 Data from ONS (2017) *Balance of Payments: Oct to Dec and annual 2016* https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/bulletins/balanceofpayments/octtodecandannual2016

19 OECD (2015) *Science, Technology and Industry Scoreboard 2015* http://www.oecd-ilibrary.org/docserver/download/9215031e.pdf?expires=1505229065&id=id&accname=guest&checksum=4D741EE0A9809317A3681C55DFA23561

20 Goodrich P., Haskel J., Hughes, A., Wallis, G. (2015) 'The contribution of public and private R&D to UK productivity growth' *Imperial College Business School Discussion Paper 2015/03,* http://spiral.imperial.ac.uk/bitstream/10044/1/21171/2/Haskel%202015-03.pdf

21 ONS (2017) *UK gross domestic expenditure on research and development: 2015* https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/bulletins/ukgrossdomesticexpenditureonresearchanddevelopment/2015#country-and-regional-breakdown-of-uk-rd-expenditure

Figure 1.8: Research intensity, expressed as gross expenditure on research and development as a percentage of GDP[22]



Although there is a temptation to pick one of these weaknesses – perhaps productivity – as the overriding priority for the government and the new strategy, we believe this would be a mistake as most or all of these weaknesses need to be addressed together, if any one of them is to be overcome. For example, it will be far more difficult to raise the national level of productivity without significantly raising productivity in parts of the UK outside London and the South East. We therefore disagree with those who argue that the present emphasis on place in industrial strategy is only a political matter. While the political consequences of great regional inequality have clearly become significant, addressing those inequalities is an economic imperative.

The major weaknesses we identify are deep-seated, but we do not believe that any of them, collectively or individually, is insurmountable – and they should not be accepted as permanent structural features of the UK economy. However, unless they are addressed by the state in a concerted and strategic way, they are set to persist – and this will continue to prevent the full potential of the UK's people, places and industries from being realised.

Recommendation: The UK economy has many strengths and areas of opportunity, but the reality must be accepted that it also contains many sustained weaknesses. The government should commit to addressing all of the weaknesses set out above through strategic economic management.

22 Data from OECD Gross domestic spending on R&D https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm

The role of the state

Achieving resilient economic development that leads to higher productivity and incomes, and widely shared prosperity, depends ultimately on private sector businesses, individuals and third sector bodies. But there are some roles that only the state can play.

The state has essential, universal and unchanging functions. It must assure the security and defence of its citizens. It must provide basic infrastructure and public goods; enable improvements in health and living standards over the long-term, and equip citizens with the capabilities to accomplish the things they value and to participate in civic life. However, states can only fulfil these functions if there is a resilient economy creating wealth. State and market are interdependent and rely upon each other. Industrial strategy is the means by which the state can strategically shape economic activities – across the public and private sector – to enable it to fulfil all of its essential functions.

Sceptics decry strategic government interventions in the economy, painting industrial strategy as a failed process of 'picking winners' or compensating 'losers'. The 'state versus market' framing of policy choices is a false dichotomy; the choice is between an intended and an accidental strategy.

It is true that past interventions were not all successful, reflecting government failures. However, the multiple linked weaknesses of the UK economy are evidence that the absence of a strategic approach by government in the past 30 years, supposedly relying chiefly on 'markets', has failed.

Multiple market failures provide a strong and compelling rationale for why strategic government management of the economy is necessary:

- Co-ordination by the state is needed to align individual activities across the economy, including seeding agglomeration economies.
- The state can pool risk when the returns from innovation are too uncertain for individual investors. This may be especially important when innovation is needed to address known long-term challenges facing society (such as ageing or climate change).
- The state can also create markets and substitute for missing markets (such as lending to a portfolio of early-stage businesses, which can find it hard to raise private finance because of information asymmetries).
- State provision of public goods such as research is essential, as the private sector tends to under-provide these and seeks to prevent others from accessing them.
- The government will also need to address externalities, wherever the social costs or benefits of an activity diverge from the private.

It is of course true that market and government failure will occur in the same contexts for the same underlying reasons, such as asymmetries of information and incomplete markets. In our recommendations in this report, we include safeguards against the risks of government failure (whilst also recommending that the new strategy embeds a greater understanding and acceptance of risk). In particular, although we consider increased government spending in some key areas such as research and infrastructure to be important, we do not favour sector-specific subsidies or tax breaks. We also consider a strong competition policy regime to be an essential component of industrial strategy. This demands an institutional framework that balances independent scrutiny of policies and political accountability, to guard against the political temptation to rescue 'significant' failing businesses (a temptation, it should be noted, that politicians succumb to whether they have an industrial strategy or not).

If industrial strategy is understood in these terms– as strategic economic management – then there should be no scepticism whether the UK requires an industrial strategy. The only debate should be about *what* a new strategy addresses and *how* that strategy can be as successful as possible.

If the UK's need for strategic management of the economy is so clear – and we welcome the growing consensus in its favour – then we must examine why the UK has, to date, not had the comprehensive industrial strategy we need. Understanding this is vital because future success will only come if lessons of the past are analysed and learned. The right prescription can only be applied if the diagnosis is correct.

Recommendation: The new industrial strategy must be designed with a comprehensive understanding of the state's unique powers of coordination and convening, and its ability to pool risk, create markets and provide public goods.

1.2. Learning from the past

All previous governments, irrespective of party, have acted to steer, intervene and shape the economy in some form and with varying degrees of success. The UK has had many policies for industries, policies for science and innovation, policies for skills and so on, but they have not comprised an explicitly defined industrial strategy with a strategic and holistic view of the state and economy. Below we discuss the main reasons for this based on the evidence we have received and our analysis.

The foundations of industrial strategy

Industrial strategy is the strategic long-term co-ordination of interactions between the state and the private sector economy. It cannot easily be compartmentalised into neat sectors, departmental responsibilities, places and industries. It cuts across all these boundaries, which reflect the traditional lenses through which the economy is understood. A new strategy must therefore be built upon foundations that share this cross-cutting approach.

In our first report *Laying the Foundations* we identified the key themes that must be considered foundational to a new strategy.

A new institutional framework: A long-running characteristic of the UK's industrial policy weakness is the absence of a robust institutional framework through which industrial strategy can be determined, implemented and monitored. A new institutional framework is now needed to place industrial strategy at the heart of government, and embed it throughout the state. A new governance and delivery framework for industrial strategy must ensure strong co-operation between all public and private institutions in all parts of the country and in parts of the economy, that are involved in a new strategy and meeting its goals.

Place: A new strategy must build on the existing strengths of the UK's local economies and seek to enable growth everywhere. It must provide adequate investment for weaker parts of the economy, focus on creating high productivity clusters and challenge the UK's high-degree of political and economic centralisation.

Science, Research and Innovation: A new industrial strategy must have a holistic view of the UK's science, research and innovation landscape. It must seek to correct the UK's low R&D intensity and address large regional disparities. A new strategy must balance support for high quality discovery research, research to support government priorities, and the development and commercialisation of research.

Competition policy: A strong competition and state aid regime is an essential component of a new industrial strategy. A new strategy must join up competition policy, regulatory functions and consumer policy to bring a strategic perspective to ensure markets function well, enable innovation and facilitate new entry to markets and structural change.

Investment: A new strategy must increase the UK's investment rate and achieve a more diverse financial ecosystem. It should increase and co-ordinate public investment, ensure financial regulation is consistent with industrial strategy objectives and should encourage industry, institutional investors and venture capital to unlock long-term investment.

Skills: Addressing the UK's historic skills deficit and ensuring better utilisation of people's skills must be core to a new strategy. Future skills policy must be more stable and holistic in its approach, better connected to other areas of policy, and seek to increase both the overall supply of general technical skills and develop the specific skills needed for particular sectors and places.

The state's purchasing and regulating power: A new strategy must ensure the state's purchasing and regulating power is used to drive innovation and exploit the state's role as a lead customer for new technologies. This will require the focus of procurement policy to shift from solely achieving short-term cost savings and will require higher institutional tolerance of risk.

Recommendation: A long-term and viable industrial policy framework should be built on these foundational themes.

Some shortcomings of UK industrial policy practice

UK industrial policy practice has achieved positive outcomes but it lacks a strategic framework. The new industrial strategy needs to address the shortcomings of industrial policy practice head-on, and rethink the role of the state.

Industrial strategy has never been fully embedded within thinking and policy practice throughout the state.

- The failure to embed industrial strategy throughout the state has led UK policymakers to treat industrial policies as distinct from and often peripheral to other areas of policy, particularly macroeconomic policy. Industrial strategy should be considered central to all policy areas that impinge upon the economy and should be recognised and established as the organising principle for all UK supply-side economic policy.
- Too often within Whitehall industrial strategy has simply been considered to be what the business or industry department does, with other departments closely guarding their policy areas. Industrial policies have been developed and implemented within departmental silos without cross-government co-ordination. The Treasury, in particular, has not consistently committed to strategic supply-side economy policy.[23]

Industrial policies have not been developed with a whole economy approach.

- In the absence of a 'whole economy' perspective, whole sectors and core parts of the economy, that employ large numbers of people, are often not thought about strategically and considered to fall outside the purview of industrial strategy (e.g. health and social care, or retail).

23 Kingman, J. (2016) 'The Treasury and the supply side', speech delivered on 20 October https://www.scribd.com/document/328294000/Kingman-Speech

- Without a holistic overview of the policy landscape unintended consequences and spillover effects from policies, positive and negative, can be missed and not learnt from. The persistence of departmental silos sustains this problem.
- Not having an overview of the entire policy landscape also contributes to social policy rarely being considered as a necessary component of industrial strategy. Social policies in welfare or education, for example, have direct implications for the economy and should not be seen as separate from industrial strategy.

Industrial policies have been designed with a limited understanding of sectors.

- 'Horizontal' industrial policy, which aims to create conditions that improve productivity unselectively across the whole economy, is necessary but not sufficient to tackle the UK's deep-seated productivity problems. More selective interventions are necessary, but sector-focused 'vertical' policy has pitfalls too.
- Sector-focused interventions, unless carefully designed, risk blunting competition, privileging well-organised groups of incumbents (and rewarding lobbying and rent-seeking by them) at the expense of the wider economy, and disadvantaging new, challenger firms and sectors.
- Successful sector-based interventions are possible, as shown by the recent revival of the UK's automotive sector. Such successes are informed by analysis of future markets, and are designed to facilitate the strong potential for new entrants as well as incumbents to capitalise on future opportunities. Past policies have too often sought to maintain the position of fading industries, and were not judged by the extent to which they create productive potential.
- Sector-focused policy can only be successful if its understanding of sectors is accurate. Our current sector classification is too rigid and defined by a backwards-looking classification that fails to reflect today's economy (and its future trajectory). For example, technology-driven changes in manufacturing business models are substantially blurring the lines between manufacturing and high-value services, in the process of 'servitisation'.[24]
- A new strategy should move beyond the sector approach to analyse whole value chains, judging interventions by how effectively they can support the highest value-creating activities in existing and emerging industries. To achieve this there must be greater understanding by government of how businesses operate and make decisions, and the importance of supply chains. Officials need to be given the scope and time to develop their knowledge of the economy, to get out of Whitehall and 'get their shoes dirty'.[25]
- Closer connectivity with business and regional policymakers, supported by more accurate regional data, will help to identify and understand industries and places in which the UK has, or could have genuine comparative advantage, and to develop policies to support them.

24 Helo, P. et al (2017) 'Servitization: Service Infusion in Manufacturing', Designing and Managing Industrial Product-Service Systems, Springer Briefs in Operations Management http://link.springer.com/chapter/10.1007/978-3-319-40430-1_2

25 O'Connor, S. (2016) 'The best economist is one with dirty shoes' *Financial Times* https://www.ft.com/content/07d4e7c6-4d90-11e6-88c5-db83e98a590a

Some entrenched decision-making processes undermine industrial policy and practices. Significant issues of concern are:

Standard cost-benefit analysis methodologies:

- The assessment of potential public sector investments is based on standard cost-benefit analysis methodologies which tend to undervalue potential non-linear benefits from investments that will accrue over time. Such assessments also tend to reward the incumbents and places that are already successful and reinforce existing patterns of agglomeration.

The efficiency/equity trade-off:

- Industrial policy and practices have persistently failed to recognise the trade-offs between efficiency and equity.
- An over-reliance on Value for Money criteria methodologies steers investment decisions towards short-term 'efficiency gains' or cost cutting.
- Policymakers must recognise that industrial strategy involves policy choices being made by individual politicians and by governments collectively. It is perfectly legitimate and correct for decisions to be weighted towards achieving equity over efficiencies, where the benefits may not be realised for some time.
- The new industrial strategy should not be afraid to acknowledge and even embrace this trade-off. Steering outcomes towards equity over efficiency will mean some people, places and industries benefit more than others but this is necessary if the UK's longstanding social inequalities, regional imbalances and economic weaknesses are to be addressed.

Jam spreading:

- Public investments too often fall into the trap of 'jam spreading'. Policymakers must seek to avoid spreading government interventions too thinly across different places. They should accept the reality of agglomeration economies and act with the strategic aim of capitalising on the benefits of clustering. State investment in nanotechnology illustrates this point. In the 2000s twenty-four nanotechnology facilities were created with many in locations where they struggled to attract private investment.[26] Most have closed and a strategic decision should have been taken to create a small number of larger clusters.

Innovation policy focuses too much on the supply-side:

- Science and innovation policy has been dominated by the supply-side, believing that maintaining a strong fundamental research base and a supply of skilled people is sufficient to ensure radical innovations come to market and translate into economic benefits. Too little emphasis has been given to the creation of new markets for innovative technologies, and mechanisms to diffuse these innovations and associated skills and business practices throughout the economy.

Policy decision-making and accountability in the UK is weakened by centralisation and the absence of a robust institutional framework.

- A frequently changing departmental framework at the national level and a history of unstable, and often absent, institutional structures at regional and local authority levels both indicate the marginal nature of industrial strategy within the core function of government. Policy decision-making and accountability is further weakened by the UK's high degree of political and administrative centralisation.

26 This programme was highlighted by the then science minister, David Willetts, giving evidence to the House of Commons Science and Technology Select Committee in July 2010 https://www.publications.parliament.uk/pa/cm201011/cmselect/cmsctech/369/10072202.htm

The policymaking mindset is not sufficiently focused on market creation and capitalising on emerging markets.

- Industrial policies are often, through necessity, developed in response to a moment of crisis relating to a market failure or external shocks, and have not been focused on achieving future success through market creation and seizing new opportunities. Too often industrial policies have been seen as just being a short-term response to address failures. This contributes to the prevailing discourse around industrial policy in the UK being cast in almost wholly reactive and negative terms.

Industrial policies have failed to utilise the state's purchasing and regulating power.

- State procurement accounts for around one third of all public sector spending.[27] Yet the state's enormous influence on the economy through its role as a purchaser of goods and services from the private sector and by regulating markets is rarely strategically used.
- Procurement decision-making processes are tightly wedded to cost reduction, achieving 'value for money' through contestability, and evaluated using standard cost-benefit analysis methodologies. While public money must always be spent wisely, sometimes short-term savings should be forgone in order to reap much larger potential savings and better outcomes over the longer-term. Greater tolerance for the risks this will introduce is required.
- Industrial strategy should seek to steer public procurement towards meeting policy goals which can only be met through innovation in partnership with the private sector. Health and social care, and energy, are two areas where the potential for procurement to achieve transformative outcomes is most evident.
- Governments through their purchasing and regulatory power can drive the promotion of innovation and create markets where the private sector cannot, for example by taking on the role of lead customer for new technologies. The reshaping of the Small Business Research Initiative, which accounts for around £75 million annual government spending, has been a positive development in this spirit which needs to be built on.[28]

Many of these shortcomings are deep-seated within the UK polity and the culture of policymaking. They will take time to correct, further demonstrating why industrial strategy must have a long-term approach. Institutional memory informs practices that in many instances need to be 'unlearnt'. Rewiring the state to think and act differently in order to be able to effectively deliver a new industrial strategy is a major and necessary part of putting a new strategy in place.

27 In 2013/14 the state spent £242 billion. See: Booth, L. (2015) 'Public procurement', *House of Commons Library Briefing Paper 6029* http://researchbriefings.files.parliament.uk/documents/SN06029/SN06029.pdf. In addition to direct government spending, a substantial amount of national infrastructure is privately funded in strongly regulated sectors, such as energy , where the government has both substantial financial exposure (through, for example, loan guarantees) and a high degree of effective control. This amounts to around 30% of the total £300 billion national infrastructure pipeline up to 2020/2021. See: HM Treasury and Infrastructure and Projects Authority (2016) *National Infrastructure and Construction Pipeline 2016* https://www.gov.uk/government/publications/national-infrastructure-and-construction-pipeline-2016

28 Connell, D. (2014) 'Creating markets for things that don't exist' *Centre for Business Research* http://insight.jbs.cam.ac.uk/assets/Main-report-Creating-markets-for-things-that-dont-exist.pdf

Getting good public policy outcomes is hard. Policy is made by learning from experience and sometimes the wrong decisions, despite careful analysis based on the best possible evidence, will be made. Poor outcomes from some decisions are inevitable, but they should not be used as an excuse for inaction and or as a justification to not implement new policies or practices.

Recommendation: The UK needs significant cultural change in policymaking so that the new industrial strategy does not become paralysed by risk aversion and short-termism.

Understanding technological change

Technologically-driven change is how economies evolve and develop. To capture fully the benefits of technological change, a new industrial strategy must have at its heart a sophisticated understanding of the nature of that change and its possible and likely trajectories. It must also recognise the reality of the UK's position in an evolving global economy. This understanding is essential because industrial strategy must think forward about technological change - and indeed aim to steer technology in ways that meet societal goals.

- **Technological change offers great potential for productivity gains**: The ultimate driver of sustainable productivity growth is technological change, which can dramatically reduce costs and, create new products, services and processes. New technologies generate new ways of organising services and enable the development of entirely new kinds of businesses and industries. A new industrial strategy must seek to fully capture these benefits.
- **Technological change is not predestined or evenly distributed**: Technology is not a single thing that proceeds evenly with a single rate of change, nor is it predestined to unfold in a particular way. Very fast progress in one area of technology (information and communications technologies, for example) may not be able to compensate for slower technological change in other sectors. Seemingly important technologies may turn out not to bring big productivity benefits.
- **The state has an essential role in driving technological innovation**: Technological change takes place in a global context, and limits the agency of national governments. It is the private sector - typically multinationals - that drives innovation in the market. However, the government is far from impotent in setting the pace and direction of technological change. The history of recent technology gives many examples of world-changing innovations whose development has depended strongly on state support, typically brought to market through considerable subsequent private sector research and development (R&D) and product development.[29] The state's ability to co-ordinate activities, set technical standards, shoulder risks, enforce competition policy and create markets is key.
- **Focus on diffusion, as much as disruption**: It is a risk for industrial strategy to obsess about the new and novel.[30] Despite inevitable labour market disruptions, in twenty years many people will be doing jobs that are essentially the same as today. Infrastructures are very long-lasting; using, maintaining and upgrading those infrastructures may be less glamorous than the promise of massive disruptive change, but this will continue to account for a large part of the economy. While new technology will affect the whole economy, policy must focus on accelerating the diffusion of both new and existing technologies.

29 Mazzucato, M. (2013) *The Entrepreneurial State: Debunking Private vs. Public Sector Myths*. London: Anthem Press; Janeway, W.H. (2012) *Doing Capitalism in the Innovation Economy: Markets, Speculation and the State*. Cambridge: Cambridge University Press.

30 Edgerton, D. (2008) *The Shock Of The Old: Technology and Global History since 1900*. London: Profile Books.

- **A balanced, long-view approach is required**: Balanced discussion of the economic potential of new technologies is made more difficult by excessive neophilia and hype.[31] Many emerging technologies can, despite the excitement that surrounds them in their early stages, (a) take much longer than anticipated to make an impact, (b) not find the markets they anticipated, and (c) fail to make a material impact on the economy as a whole.

A new industrial strategy that recognises these points will greatly enhance its potential to use new technologies to capture the many opportunities they provide and direct them towards societal goals. To illustrate this potential we draw attention to four broad areas of technological change where the current and likely future impacts are being felt in the UK and globally.

- **Energy markets**. Rapid uptake of renewable energies, discussed in Chapter 3, and the resultant cost reductions mean unsubsidized costs of renewable energy are now competitive with fossil fuels in many parts of the world. This is already severely disrupting energy markets, overturning the assumptions (and business models) of incumbent companies and governments[32], and triggering the urgent need for better energy storage techniques and for smart grids which more dynamically match energy supply and demand.
- **Information and communication technologies (ICT).** Increasing digital connectivity, the ubiquity of net-connected sensors, and new techniques for extracting information from the resulting unstructured masses of data (machine learning) all offer great potential for new markets and productivity gains.[33] One example of the current transformative effects of ICT is in manufacturing where the incorporation of digital technologies is enabling successful manufacturing firms to move their focus from creating physical artefacts to capture more of the value chain, in developments often referred to as Industry 4.0.[34] Further penetration of robotics and automation will bring challenges but it will also clearly help to improve productivity.
- **City living, infrastructure and mobility**. The move towards electrification of vehicles is quickening, driven as much by the problem of urban air quality as by the need to reduce CO2 emissions, and in parallel major efforts are being made to create driverless, connected vehicles. These developments may have far-reaching effects on our infrastructure, physical environment and lifestyles.[35] They also have the potential to address the three challenges of congestion, capacity, carbon that the National Infrastructure Commission highlighted in its recent interim National Infrastructure Assessment.[36]

31 Nuffield Council on Bioethics (2012) *Emerging biotechnologies: technology, choice and the public good,* http://nuffieldbioethics.org/project/emerging-biotechnologies; Jones, R. A.L. (2008), 'The Economy of Promises', *Nature Nanotechnology* 3, 65 - 66 http://www.nature.com/nnano/journal/v3/n2/abs/nnano.2008.14.html

32 Carbon Tracker Initiative, Imperial College (2017) *Expect the unexpected: the disruptive power of low-carbon energy* http://www.carbontracker.org/wp-content/uploads/2017/02/Expect-the-Unexpected_CTI_Imperial.pdf

33 Royal Society (2017) *Machine Learning: the power and promise of computers that learn by example* https://royalsociety.org/topics-policy/projects/machine-learning/

34 National Academies Press (2015) *Making Value for America: Embracing the Future of Manufacturing, Technology, and Work* http://www.nap.edu/catalog/19483/making-value-for-america-embracing-the-future-of-manufacturing-technology; Kagermann, H. et al (2013) 'Securing the future of German manufacturing industry: Recommendations for implementing the strategic initiative INDUSTRIE 4.0', *Final report of the Industrie 4.0 Working Group, Acatech* http://www.acatech.de/fileadmin/user_upload/Baumstruktur_nach_Website/Acatech/root/de/Material_fuer_Sonderseiten/Industrie_4.0/Final_report__Industrie_4.0_accessible.pdf

35 Government Office of Science (2016) *Future of Cities Foresight Project* https://www.gov.uk/government/collections/future-of-cities#project-reports

36 National Infrastructure Commission (2017) *Congestion, Capacity, Carbon: Priorities for National Infrastructure* https://www.nic.org.uk/wp-content/uploads/Congestion-Capacity-Carbon_-Priorities-for-national-infrastructure.pdf

- **Healthcare**. Healthcare, discussed in Chapter 5, demonstrates the potential benefits of technology, but also the potential shortcomings and risks. Enormous opportunities are anticipated from the expansion of medical data, yet this raises societal and ethical issues.[37] More negatively, big increases in neurodegenerative diseases are projected as populations age. These diseases remain resistant to the development of new therapies - a reflection of a more general problem of apparent diminishing returns in drug discovery.[38]

These four areas illustrate the transformative potential of new technologies – but nothing about that potential is predestined. History tells us that for the opportunities and value of technological changes to be realised strategic co-ordination between the state and private sector is essential. A clear and sustained focus on diffusion not disruption should be kept foremost in mind as a new industrial strategy is developed.

Recommendation: The new industrial strategy should recognise the state's essential role in driving technological innovation, and focus on diffusion, as much as disruption. It will be important for it to be informed by rigorous and critical analysis, drawing on the expertise of National Academies, Research Councils, and the wider international academic and business communities. It should embrace technological change and seek to capture the benefits, but a critical perspective to occasionally overstated claims is always necessary.

1.3. A positive vision

Our analysis and evidence-gathering leads us to conclude that the UK has a compelling and overwhelming need for strategic economic management. We have presented analysis of the weaknesses and challenges facing the UK economy, outlined the foundations that a new strategy must be built upon and identified the shortcomings in existing UK industrial policy practice. Learning from this analysis and adopting the right foundations will be necessary for a successful new strategy, but not sufficient by itself. The final – and arguably the most important component – for a new industrial strategy is that it must provide a positive and aspirational vision of a future destination for our country, and it must be motivated by an urgent sense of national purpose.

A positive vision does not mean grandiose rhetoric, but can be provided by focusing on the material differences to people's everyday lives that industrial strategy will seek to achieve. We believe this can be done by reframing the challenges we face as strategic goals for a new industrial strategy to meet. At any time all countries need to address a range of urgent and specific challenges. They are the highest priorities that a population faces. And it is the state through its unique ability to strategically co-ordinate economic activity, share risks and make investments that can ensure these challenges are met – or, in other words, through industrial strategy.

37 Bland, J., Khan, H., Loder, J., Symons, T. and Westlake, S. (2015) The NHS in 2030: a vision of a people-powered, knowledge-powered health system, *NESTA* http://www.nesta.org.uk/publications/nhs-2030-people-powered-and-knowledge-powered-health-system

38 Scannell, J. W., Blanckley, A., Boldon, H. and Warrington, B. (2012), 'Diagnosing the decline in pharmaceutical R&D efficiency' *Nature Reviews Drug Discovery* 11, 191-200.

The strategic goals of the state will evolve over time. Some will endure, but new goals will also emerge to replace those that are met or become less urgent. As we set out in *Laying the Foundations* our assessment, shaped by the Commission's evidence-gathering and engagement, is that the strategic goals for the UK in 2017 and for the foreseeable future are:

- **Decarbonisation of the energy economy**
- **Ensuring adequate investment in infrastructure**
- **Developing a sustainable health and social care system.**
- **Unlocking long-term investment**
- **Supporting high-value industries and building export capacity**
- **Enabling growth through the whole of the UK**

Far from being abstract, these six goals – and the impact of *not meeting them* – have major implications for the everyday lives of the UK's citizens. They cut across state and economy. They are not confined to certain sectors or industries, nor only place-specific, nor are they the responsibility of single government departments. It will only be possible to meet these goals with an industrial strategy that is embedded throughout the state and if all supply-side economic policy is co-ordinated towards meeting them.

But whilst the challenges are large, so are the potential rewards. An industrial strategy guided by meeting these goals offers the potential for the UK's people, places and industries to achieve the extraordinary and to transform 'ordinary' day-to-day life in the UK.

Through the endeavours of the UK's people, in our industries and research base, extraordinary outcomes are already being achieved. The UK is home to some world-leading universities and industries and the industrial strategy should seek to build the diffusion mechanisms that enable their knowledge and innovation to link to the more 'everyday economy' that provides employment for the majority.

In the following chapters we will focus on how each of the strategic goals we have identified can be met through a new industrial strategy, having first focused on the necessary delivery and governance mechanisms for a new industrial strategy.

Recommendation: A new strategy should have an ambition to achieve positive outcomes and make material differences to people's everyday lives, and not confine itself to a few 'sector deals'.

2. Institutional framework and delivery mechanisms

This chapter considers the institutional framework and delivery mechanisms required in order to make the industrial strategy a success. The role of institutions in embedding good practice, and therefore enabling better policies, is too often overlooked – and therefore the design of institutions is under-prioritised in the formation of industrial policies. Institutions enable policy learning through institutional memory, and offer a forum for coalition-building and trade-offs so that ideas can be translated into actual practice. Good institutions are able to withstand the short-termist pace of political life, enabling the establishment of policy agendas which endure across several administrations (vital for a successful industrial strategy). Institutions can also play an essential role in mediating between the public and private sectors.

Successive governments have been too quick to reform institutional frameworks around industrial policy and related areas simply to suit exigent political circumstances, and too neglectful of the need for robust institutions geared towards delivering strategic objectives over the long-term.

Our analysis and recommendations are based on three guiding principles. First, there is an urgent need for vision, impetus and co-ordination of industrial policies at the national level. Second, institutions must be developed which maximise opportunities for local economic development, with powers therefore devolved to sub-national levels wherever possible. Third, there is a need for as much policy and institutional stability as is politically possible. These principles give rise to an agenda which is both far-reaching and pragmatic.

Forging a comprehensive industrial strategy requires us to consider carefully how central government operates, how cities and regions are governed, the resources (including data and analytical capacity) available to relevant authorities, and how policy functions which deliver key areas of any industrial strategy – such as science and innovation, and skills – can be aligned to overarching strategic goals.

Since the strategic goals associated with industrial strategy must be embedded in all government bodies, where relevant, those ultimately responsible for ensuring the goals are pursued must have the authority to shape how they function. In other words it will be impossible to create a successful, long-term industrial strategy for the UK without it being owned by and driven from the top, including the Prime Minister and the Treasury. To succeed, a substantive and comprehensive industrial strategy must be overseen by central government, and what is more, by individuals and departments at the heart of central government.

Given the geographical inequalities that the UK's industrial strategy must address it is also vital that local and regional authorities are able to shape the strategic economic management of their economies. It has become a policy cliché to recommend a new relationship between national and local government – but that is precisely what is needed here if a new industrial strategy is to improve economic performance throughout the UK. Clearly, a new balance between national and local decision-making must also enable better co-ordination between the two.

Recommending new institutions and delivery mechanisms is fraught with difficulty – not least because of the destabilising effect of organisational churn. Policy stability is essential for a successful industrial strategy, yet the UK has spent much of the last few decades chopping and changing the organisations that are responsible for a range of key policy areas, including business regulation, energy, trade, skills, science and innovation, and local and regional economic development.[39] However this is not a strong enough reason to accept the immutability of failing policy mechanisms. As such, whilst our recommendations seek wherever possible to rely upon

39 Norris, E. and Adam, R. (2017) *All Change: Why Britain is so prone to policy reinvention, and what can be done about it*, Institute for Government. https://www.instituteforgovernment.org.uk/publications/all-change

existing mechanisms, we do think there is a strong case to establish new institutions to sit at the centre of a new industrial strategy.

This chapter discusses and makes recommendations relating to:

- The development and oversight of an industrial strategy at the centre of national government.
- The development of authoritative and well-resourced industrial policy mechanisms at the local and regional level.
- Independent monitoring of the effectiveness of the UK's industrial strategy.
- The operation of key industrial policy delivery mechanisms such as skills provision and the research and innovation landscape.

2.1 Transforming how industrial strategy operates at the centre

The work of the newly formed Department for Business, Energy and Industrial Strategy (BEIS) in developing a new industrial strategy for the UK in recent months has been commendable. Indeed, the recognition of 'industrial strategy' in the nomenclature of a Whitehall department for the first time is encouraging.

But there is a risk that this change will embed industrial strategy as merely the responsibility of a relatively junior Whitehall department, subservient to other elements of economic policy. Indeed, given the history of frequent reorganisation involving the department responsible for business and industry (BEIS is the fourth department with such responsibility since 2005 – after the Department's for Trade and Industry (DTI), Business, Enterprise and Regulatory Reform (BERR)[40] and Business, Innovation and Skills (BIS)), there is also a risk that industrial strategy will disappear from the Whitehall machinery as quickly as it appeared, if political conditions change.

This risk can only be mitigated by embedding industrial strategy in the heart of Whitehall in a way that will endure. This means, by necessity, that the Treasury is involved in both crafting and delivering an industrial strategy as a matter of routine, and that progress towards achieving strategic objectives is a 'whole-of-government' agenda for which the Prime Minister and Chancellor of the Exchequer are ultimately responsible. To this end, it is also encouraging that there now exists a Cabinet Committee for Economy and Industrial Strategy, chaired by the Prime Minister. The Committee's economic affairs sub-committee is chaired by the Chancellor, and the sub-committee on reducing regulation is chaired by the Business Secretary. However, the impact of these changes remains to be seen. Until the structure and focus of central government – and its most powerful department – reflects the co-ordinating capacity of this Committee, it will rightly be seen as window-dressing for a business-as-usual framework.

In the past embedded attitudes within the Treasury have made strategic thinking about industrial strategy difficult. However, there is some evidence, of the Treasury beginning to take industrial strategy seriously again. In 2011, the Treasury and one of BEIS's predecessor departments, the Department for Business, Innovation and Skills (BIS), co-operated on the publication of the coalition government's *Plan for Growth*[41], which suggested that the coalition government would continue and expand some of the industrial policies initiated by the Labour government after the 2008 financial crisis. In 2015, after the election of a Conservative

40 See also the Department for Innovation, Universities and Skills, which was partly created from the carving up of the DTI's responsibilities.

41 HM Treasury and Department for Business, Innovation and Skills (2011) *Plan for Growth* https://www.gov.uk/government/publications/plan-for-growth--5

majority government, the Treasury alone published the successor to the growth plan, *Fixing the Foundations: Creating a More Prosperous Nation*[42] (although the then Business Secretary, Sajid Javid, co-authored the foreword with then Chancellor, George Osborne).

However, *Fixing the Foundations* is more widely known as 'the productivity plan', and the initiative in effect narrowed the scope of industrial strategy (as well as temporarily 'abolishing' the use of the term) and reaffirmed the Treasury's rather narrow and unstrategic stewardship of policy areas related to improving productivity. In practice, there remains a danger of continuing a longstanding divide in which economic policymaking, undertaken by the Treasury, functions somewhat separately from BEIS's (or its predecessor departments) work, even where the two areas overlap substantially. Even a much stronger BEIS would, in all likelihood, fail to wrestle control of the UK's *de facto* (and failing) industrial strategy from the Treasury.

It is of course absolutely right that the Treasury should focus on the issue of productivity, but as part of a distinct and comprehensive industrial strategy, rather than as one of a suite of policies secondary to the Treasury's primary responsibility for fiscal policy. One of the most important answers to the UK's industrial strategy conundrum must therefore be ensuring that its most important, enduring and widely-respected organ of economic policymaking adopts strategic economic management as a core responsibility.

Given our view that the UK's economy is over-centralised – and indeed that this problem is related to an over-centralised political system – it might seem incongruous that we advocate strong, national-level oversight for industrial strategy. Clearly, however, industrial strategy as an area of policy is already owned by central government (almost by default, until recently), but it is operationalised in sub-optimal ways. The point is not for more power to accumulate at the centre, but to ensure that the power that the centre has (and must have) is properly exercised – and that the requisite policymaking frameworks allow for the systematic input by local and regional authorities into national objectives.

It should be noted that what is being suggested here is not particularly common among similar economies, including those with stronger industrial policy traditions and better productivity growth. Generally speaking, in most developed countries, industrial strategies belong to departments which ostensibly resemble BEIS, while departments which ostensibly resemble the Treasury focus on fiscal policy and budgetary issues. It may be, therefore, that the UK should simply empower BEIS at the expense of the Treasury.

However, as suggested above, there are a number of problems with this reasoning. Above all, the Treasury is not just a finance ministry; it is already an economics ministry, albeit not one particularly amenable, traditionally, to industrial policy. Even with 'industrial strategy' in its name, BEIS does not fulfil this function in the way that equivalent departments in other countries do.[43] Departments responsible for industrial strategy tend to occupy a higher status within government structures elsewhere – above finance ministries as economic policymaking bodies – and are able themselves to co-ordinate other departments around strategic economic plans.[44]

42 HM Treasury (2015) *Fixing the Foundations* https://www.gov.uk/government/speeches/fixing-the-foundations-boosting-britains-productivity

43 The temporary existence of the Department for Economic Affairs (DEA) for example, created in 1964 and abolished in 1969, is an instructive example in this regard. Despite its name, the DEA did not exercise meaningful control over UK economic policy.

44 Coates, D. (2015) 'Industrial policy: international experiences', in Bailey, D., Cowling, K. and Tomlinson, P.R. (eds) *New Perspectives on Industrial Policy for a Modern Britain*. Oxford: Oxford University Press, pp 41-59; Berry, C., Gamble, A., Hay, C., Hunt, T. and Payne, T. (2016) Reforming the Treasury, Reorienting British Capitalism, *SPERI British Political Economy Brief No.21* http://speri.dept.shef.ac.uk/wp-content/uploads/2016/03/Brief-21-Reforming-the-Treasury.pdf

To achieve a similar outcome in Whitehall, an institutional framework which recognises the Treasury's longstanding status in the UK system and its role as a finance *and* economics ministry, and in co-ordinating other government departments, is required. The key is to ensure that the Treasury begins to produce meaningful strategic plans in conjunction with departmental partners.

Recommendation: A new industrial strategy division should be created within the Treasury, overseen by the Chief Secretary, with the power to ensure that all other departments devise and implement policies consistent with the industrial strategy. The existing structure of the Treasury must change to reflect a new approach to industrial strategy. BEIS should be retained as a key delivery department. Officials from several departments, including BEIS, the Cabinet Office and 10 Downing Street, along with local, regional and devolved authorities would be directly involved in the day-to-day work of the new division.

2.2 Further and faster devolution

Recent years have seen a wave of devolution initiatives in England, as the structures established in the devolved nations – Scotland, Wales and Northern Ireland – have matured. We welcome this development. It is based largely upon the penetration of Treasury thinking by theories of urban agglomeration. However, as discussed in our first report, it is vital that policy is informed by an understanding of various agglomerative dynamics, and above all that the correct governance processes are established locally and nationally to ensure that we maximise the benefits of agglomeration.

One of the problems with the recent wave of English devolution is that it has essentially been foisted upon a quite messy array of local government structures, and complex national/local delivery mechanisms across a range of policy areas. At the city-region level we now have a patchwork of new institutions and varying agreements over powers, resources and accountability. In terms of policymaking, Local Enterprise Partnerships (LEPs), councils, combined authorities and in some cases 'metro-mayors'[45] all sit quite uncomfortably alongside each other – together with a different model in London led by a mayor nominally accountable to an elected London Assembly, albeit with many powers retained by London borough councils. Outside the major cities, there are further complications, often with multi-tier local authorities and a collection of LEPs with different (and occasionally overlapping) geographical boundaries.

That said, the value of stability – so often overlooked in local government reorganisation – means that we believe it would be right to proceed with the broad framework of LEPs, combined authorities and new metro-mayors, with strengthened resources and powers and a clearer role in developing and delivering 'local' industrial strategy. Consideration should be given to the geographical boundaries of LEPs to ensure they better reflect economic geographies. We also strongly support plans for new borrowing powers for mayors and combined authorities, where linked to a long-term industrial strategy.[46]

45 Metro-mayors have now been elected in Greater Manchester, Merseyside, the West Midlands, Cambridgeshire and the East of England, the Tees Valley and the West of England.

46 In the Autumn Statement 2016, the Government announced it would give 'mayoral combined authorities powers to borrow for their new functions, which will allow them to invest in economically productive infrastructure, subject to agreeing a borrowing cap with HM Treasury'; see https://www.gov.uk/government/topical-events/autumn-statement-2016

However, it is important that there is much greater clarity over the relationship between these component parts, and that the institutions assuming responsibility for their cities and regions have what they need to deliver. We would stress three essential requirements: institutions need to have *democratic legitimacy*, to enable them to set priorities and make difficult decisions. They need to have *analytical capacity*, in order for them to make good policy founded on the best evidence, and they need to have *powers and resources* commensurate with their responsibilities.

When they were set up in 2010, LEPs were deficient on all three counts. In many areas LEPs now enjoy a privileged status within local economic policymaking, despite their tenuous democratic credentials, and the risk that business-led governance will benefit incumbents at the expense of new firms and industries. Many LEPs have developed significantly since their early days; they clearly have an important role to play, albeit alongside much stronger and better-resourced local authorities focused on long-term economic development.[47]

Further consideration is clearly required to ensure that areas beyond the major cities are equipped to improve their economic performance. Whilst the potential for the England's large city-regions, especially those around Manchester, Birmingham, Liverpool and Bristol, to significantly improve their economic performance is evident, incentives need to be stronger if other significant economic areas but with less obvious urban centres are to follow suit. Some are performing well – such as the Oxford/Milton Keynes/Cambridge corridor – and we must ensure that a crude imposition of the mayoral and LEP models does not disrupt this success. Areas such as the East Midlands, and many coastal areas, which risk being left behind in the current process of devolution, present difficult challenges but solving them could be complimentary to a new strategy.

Co-ordination will remain important between national and local levels in all of these matters, especially if the industrial strategy is to avoid descending into a 'free for all' between different city-regions (which might involve 'bidding wars' between regions to attract inward investment, or duplicated policies leading to too many sub-scale interventions). This can be managed by the Treasury co-ordinating different interests across Whitehall departments. This also applies to key spending/regulatory agencies such as UK Research and Innovation (UKRI), the Office for Students (OFS) and the Education and Skills Funding Agency (ESFA); they should be given a formal remit to consult with mayors and local authorities and to consider industrial strategies at local and regional levels. As noted above, it is vital that better ways are found to enable local authorities to input into these national-level structures and processes. Furthermore, our proposed independent monitoring body (discussed below) can assess as well as advise on co-ordination between different areas.

It is also essential that co-ordination is enabled between city-regions and the national level. Economic processes are never confined to a single place, and where city-regions can work together to support better performance overall, they should be incentivised to do so. This may include unified political structures across several city-regions. The devolved nations offer an instructive example in this regard: while neither Scotland nor Wales have the array of economic policy powers or budgetary resources to operate a full industrial strategy, as understood by the Commission, they are clearly succeeding in 'punching above their weight' compared to English regions of commensurate levels of economic development, due in part to the role of the respective devolved administrations in co-ordinating local growth strategies.

47 For a longer discussion, see Pike, A. et al (2015) 'Local institutions and local economic development: Local Enterprise Partnerships in England, 2010', *Cambridge Journal of Regions, Economy and Society* 8(2), 185-204.

Recommendations:
Central government should devolve a significant array of powers and budgets related to industrial policy to sub-national political authorities, including those related to infrastructure, skills, business finance, planning and procurement, and some tax powers. Existing city-region and combined authority structures should be the basis for this programme of further and faster devolution, but other models should also be permitted where there is a strong consensus locally, including multi-tiered devolution whereby multiple city-regions establish a unified structure through which some powers can be exercised cross-regionally.

LEP boundaries should coincide with the appropriate economic geography. For the most part LEPS should be retained, albeit with greater attention to how they can support strategic economic management over the long-term.

2.3 Independent monitoring

As suggested above, we are proposing a second, major institutional reform at the centre: a new body to monitor the success of public authorities in strategically managing the economy. This is outlined in much greater detail in Chapter Nine, but it is worth rehearsing the key arguments here.

As a number of submissions to the Commission have pointed out, establishing a new independent monitoring mechanism would go with the grain of recent UK policy. In their submission the CBI said: 'the OBR [Office for Budget Responsibility] could serve as a model for an independent industrial strategy monitoring unit'. It continued that 'whilst the responsibility for establishing an industrial strategy and the policies that sit under it like overall fiscal policy should be set by democratically elected politicians... an independent monitoring unit can have a critical role in adding credibility to the process of delivering a strategy'.

Similarly, in his submission of evidence to the Commission Nicholas Oulton of the London School of Economics (and formerly of the Bank of England) argues that this is a model that now works well here and in other countries:

> 'The last twenty years have seen two important institutional innovations in economic policy. The first was granting operational independence to the Bank of England with an inflation targeting remit in 1997 (monetary policy). The second was setting up the Office for Budget Responsibility (fiscal policy). We need a third innovation to deal with productivity policy.'[48]

We agree with the broad thrust of Oulton's perspective. We therefore propose an Office for Strategic Economic Management which would, like the OBR, be a small independent, expert body charged with establishing its own evidence base, as well as providing monitoring, forecasting and horizon-scanning capabilities. It would therefore provide resources and advice for policymakers both nationally and locally to utilise. It would work closely with government, and be equipped to undertake detailed investigations in response to requests from government.

One example is the Australian Government Productivity Commission, but there are elements of this approach evident in other countries.[49] We would point in particular towards the role of the

48 Submission of evidence to the Industrial Strategy Commission by Nicholas Oulton, LSE (former senior economist at the Bank of England).

49 The Australian Government Productivity Commission, further considered in Chapter Nine, describes itself as 'the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians' offering 'by providing quality, independent advice and information... and on the communication of ideas and analysis'. For further information, see https://www.pc.gov.au

Swedish Agency for Growth Policy Analysis[50] and South Korea's National Economic Advisory Council[51] - although clearly the UK's specific problems require a bespoke institutional solution.

Crucially, this new body would develop metrics to assess the success of the strategy – an issue we discuss further in Chapter Nine. It would also consider the effectiveness of local strategies implemented by local and regional bodies, and as such it would be important for all areas of the country, as well as independent experts, to be represented in the new body's governance structure. In general, the governance of the new body would reflect a partnership between central government, local authorities, Parliament, academic experts, business and other relevant institutions. This would complement rather than replace the government's industrial policy capabilities, including those in our recommended new industrial strategy division at the Treasury.

Recommendation: The government should create an independent mechanism for monitoring and assessing progress of the industrial strategy. On the model of the Office for Budgetary Responsibility (OBR), we suggest calling it the 'Office for Strategic Economic Management' (OfSEM). This would signal that industrial policy is as important as fiscal policy. The title would enable it to act broadly across government and specifically to draw in Treasury interests in areas that might otherwise be considered out of scope.

2.4 The skills system

It is crucial that key delivery mechanisms of industrial policy, such as those related to skills and support for research and innovation, are not only conceived in these terms – that is, as constitutive parts of an industrial strategy – but that they are tied in to the relevant institutional frameworks at both the national and local levels. As discussed above, policy and institutional stability is essential – but so is ensuring that the policy and how it is delivered are appropriate in the first place.

The UK (and England in particular) has a poor record in workforce skills. The Leitch Review (2006) concluded that this poor record is the cause of around one-fifth of our productivity gap with France, Germany and the United States.[52] The UK is often described as being in a 'low skills equilibrium' with many firms, sectors and locations designing products and services based on low skilled and less productive workforces, simply because different approaches are impractical.[53] The OECD found that this equilibrium was even more sharply evident in certain parts of the UK.[54]

50 The Swedish Agency for Growth Policy Analysis has the task of analysing the areas that are most important for growth. The overall objective is to strengthen Sweden's competitiveness and create conditions for jobs growth throughout the country. The agency, which is further considered in Chapter Nine, works on evaluations, analyses and statistics in a broad Swedish and international perspective. For further information, see http://www.tillvaxtanalys.se/in-english.html

51 South Korea's National Economic Development Council, also further considered in Chapter Nine, was established in 1999 and is comprised of four subcommittees, specializing in macroeconomy & finance, welfare & employment, innovation economy, and a balanced economy. For further information, see http://www.neac.go.kr/en_tmp

52 The Leitch Review (2006) *Prosperity for All in the Global Economy,* HM Treasury http://webarchive.nationalarchives.gov.uk/+/http:/www.ukces.org.uk/upload/pdf/2006-12%20LeitchReview1_2.pdf

53 Finegold D and Soskice R (1988) 'The Failure of Training in Britain: Analysis and Prescription' *Oxford Review of Economic Policy*, 4 (3), 21-53.

54 OECD (2012) *Skills for Competitiveness: Country Report for United Kingdom* http://www.oecd.org/cfe/leed/skills%20for%20competitiveness%20uk%20report.pdf

These longstanding deficiencies in skills within the UK and compared to other countries in the EU and the OECD, have not been resolved – far from it – by the unparalleled chopping and changing of institutions and policy mechanisms in qualifications and local and sectoral organisations. Infamously, as the Institute for Government found – and we referenced in our first report – in England we are now embarking on our twenty-ninth major piece of skills 'reform' since the early 1980s.[55]

Clearly, policy instability has disrupted skills provision in the UK for a very long time. During the 1980s, alongside a wave of market reforms, the Thatcher government oversaw the replacement of Industrial Training Boards and the Manpower Services Commission with Training and Enterprise Councils. In the early 1990s, the Major government allowed polytechnics to become universities, and freed both them and Further Education (FE) colleges from local control. The New Labour government saw the creation of the University for Industry (now struggling on as a privatised Learndirect[56]) and the Learning and Skills Council – a national organisation funding, regulating and planning skills with 47 local arms across England.

Labour's nine Regional Development Agencies (RDAs), charged with economic development, also had responsibility for skills, alongside business support and research and innovation, across the English regions. RDAs were to be one of the delivery arms of an English devolution agenda that never materialised. Whilst the Scottish Parliament and the Welsh and Northern Irish Assemblies were established with significant powers over education and skills, only London really emerged in England with a new settlement (though with significantly less powers than the devolved nations). The 2010-2015 coalition government and the Conservative government since 2015 have handed some power in this area, with varying degrees, to LEPs and combined authorities.

Alongside these changing institutional arrangements, there have been just as many reforms to qualifications, curriculum, funding and regulation. There are now GCSEs, A Levels, 14-19 Diplomas, NVQs, GNVQs – and now 'T Levels' following the recent Sainsbury Review. Workforce training programmes have also seen significant upheaval, with many changes to apprenticeships as well as to other adult training programmes such as Individual Learning Accounts and Train to Gain. Higher Education has also witnessed equally dramatic reforms, with more universities established, and greater competition within the sector encouraged. An increase in the numbers studying in higher education has been one of the results – but so is a major decline in both part-time and work-based learning, as well as non-honours degree programmes including higher technical qualifications such as HND and HNCs, and Foundation degrees.[57]

Is this likely to be a period of stability in our institutional landscape, as well as in curricula, qualifications, funding and regulation? History would suggest not. Even the 2017 Conservative manifesto recommended a new wave of reforms including the creation of new Institutes of Technology, Local Skills Panels and a major review of Tertiary Education looking at funding for Further and Higher Education. Some of these changes may be desirable, judged on their own terms, but any further reforms need to be better connected to industrial strategy objectives.

55 Norris, E. and Adam, R. (2017) *All Change: Why Britain is so prone to policy reinvention, and what can be done about it*, Institute for Government https://www.instituteforgovernment.org.uk/publications/all-change

56 Linford, N. (2017) 'Damning Evidence Mounts against Learndirect', *FE Week* http://feweek.co.uk/2017/09/15/damning-evidence-mounts-against-dfe-over-learndirect/

57 See HEFCE (2017) 'Higher Education in England: Key Facts' http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/2017/201720/HEFCE2017_20.pdf and also Wolf, A. et al (2016) 'Remaking Tertiary Education: can we create a system that is fair and fir for purpose?', *Education Policy Institute http://epi.org.uk/wp-content/uploads/2016/11/remaking-tertiary-education-web.pdf*

Moreover, any reform must be allowed time and sufficient resources to become embedded. We believe there are several key factors that require careful consideration if a new skills system is to feed through to productivity improvement throughout the country:

- Too often skills policy is created as a freestanding system with few connections to important parallel interventions, such as science and research investment. Skills policy must be more holistic and better integrated into industrial policy as a whole, as well as better connected to particular industry needs.
- Skills policy tends to focus rather more on the supply-side – including qualification targets, volumes and curriculum change – and rather less on the demand-side or the context for acquiring and deploying skills.
- As the Industrial Strategy Green Paper acknowledges, skills policy should be more flexible and adaptable according to the needs of different places. As in most issues outlined in this report, the UK is 'unbalanced' in both its stock and flow of skills. Most towns, cities and regions outside London and the South East have lower skills levels, volumes and, more often than not, weaker and less well-funded institutions. The gaps within regions are sometimes as large as between most large cities and London. 'One size fits all' approaches in systems, resources or objectives are unlikely to even things up.
- There is a need to consider what skills implications arise from other investments and objectives in wider industrial policy initiatives – such as HS2, the proposed third runway at Heathrow, and major investment in science and research.
- New institutions must have the flexibility and autonomy to adapt to both place and sector, and build upon parallel interventions. These might include nearby employer facilities and applied research centres such as the activities brought together at Sheffield's Advanced Manufacturing Research Centre (see box below).
- More thought must be given to the vertical relationships between higher and further education as well as to horizontal links to research and innovation. Current and historical policy frameworks, and incentive structures, too easily force these sectors into competition or conflict.

The Advanced Manufacturing Research Centre

The Advanced Manufacturing Research Centre (AMRC) in Sheffield City Region provides a relevant prototype for how new institutions can achieve success by having the flexibility and autonomy to adapt to both place and sector. The University of Sheffield's AMRC is a translational research facility which brings together a series of initiatives, including Catapult Centres, Research Partnership Investment Funding and Apprenticeships, based around university research in partnership with both multinationals such as Boeing and Rolls Royce, and local and regional companies. Led by Sheffield University in partnership with employers and with the support of Sheffield City Region LEP and Sheffield City Council, the site has attracted a growing cluster of facilities for both production and research and development in various high value manufacturing sectors, including new inward investments in manufacturing by Boeing, McLaren and Rolls Royce. The aim throughout has been to develop open R&D facilities with a strong focus on translation, with very strong links both to the research base and to companies large and small, but also on developing skills in a way that joined up the landscape from apprentice-level technical training of the highest quality, through degree and higher degree level education in technology and management.

See http://www.amrc.co.uk for further details.

Institutes of Technology

Alongside 'T Levels', new Institutes of Technology focussing on higher level technical learning are a key theme in the Industrial Strategy Green Paper, the last Budget and the 2017 Conservative manifesto. Like 'T Levels', the desire to create new technical institutions is not new. Since the 1960s we have seen Colleges of Advance Technology and Polytechnics created and subsumed into the expanding university sector and more recently, Centres of Vocational Excellence (COVEs), National Skills Academies (NSAs) and National Colleges introduced into the FE sector.

Like each of these predecessors, Institutes of Technology are expected to focus on key sectors and locations and to directly support economic growth. This focus will be diluted if too many other functions are built in. They should not be a supply-side only model and employers should be more than just passive beneficiaries of their outputs. Employer investment and involvement will be critical as will a sustainable funding system derived from and based in the higher education sector. The Department for Education (DFE) should be flexible in institutional design, enabling different locations and sectors as well as consortia of universities, colleges and employers to emerge.

Crucially, applied research should be built into the model with a full partnership role and funding from BEIS via UK Research and Innovation (UKRI) for example through Innovate UK's Catapult network. LEPs and Combined Authorities should also play a major role, potentially through co-ordinating activity via local industrial strategies but also in funding and governance. Establishing a strategic relationship between BEIS and the DFE will be critical to navigating many of these issues. But oversight by the Treasury (with monitoring by the proposed Office for Strategic Economic Management) and stronger national/local links will also be paramount.

Higher and further education

In this discussion, it should also be pointed out that universities will be amongst the most important institutions in issues of human capital, innovation and in R&D. For technical skills at all levels, FE colleges as well as the proposed Institutes of Technology will also be significant. The role of universities and colleges will be particularly relevant to the industrial strategy's agenda for regional economic growth. It will be important, therefore, that the policy frameworks established as a result of the new Higher Education and Research Act[58], including the new Office for Students and the Teaching Excellence Framework (TEF), complement rather than counteract the industrial strategy's objectives for 'place'.

This is unlikely to be straightforward as neither the Higher Education White Paper[59], nor the Bill or the eventual Act, had much to say about cities and regions or the differences between them in term of economic performance. Indeed its focus on earnings and employment outcomes (the Longitudinal Employment Outcomes Survey and Destination of Leavers from Higher Education Survey[60]) may run contrary to the need for universities and colleges outside of London and the South East to play a major role in developing, retaining and deploying skills in weaker local labour markets. This is also likely to be an issue when attempting to measure innovation impact in the proposed Knowledge Exchange Framework (KEF).

58 The Higher Education and Research Act was passed in May 2017 and includes amongst other things, the establishment of the Office for Students and UK Research and Innovation. See: https://www.legislation.gov.uk/ukpga/2017/29/pdfs/ukpga_20170029_en.pdf

59 Department for Education (2016) *Success as a Knowledge Economy: Teaching Excellence, Social Mobility and Student Choice* https://www.gov.uk/government/publications/higher-education-success-as-a-knowledge-economy-white-paper

60 Longitudinal Employment Outcomes (LEO) data is published by the DFE and will be used in the next iteration of the Teaching Excellence Framework (see https://www.gov.uk/government/statistics/graduate-outcomes-for-all-subjects-by-university). Employment destinations are also recorded in the Destinations of Leavers from Higher Education Survey published by HESA and available at: https://www.hesa.ac.uk/news/29-06-2017/sfr245-destinations-of-leavers

Many of the same issues apply to FE colleges and as evidence from Professor Alison Fuller and Professor Lorna Unwin outlined, this comes from the 'centralised nature of much of the UK's (ever changing) policymaking and governance (that) has engendered passive and reactive behaviour at local and regional level, and a rule-dependent approach in government agencies'.[61] They argue for a 'much more forward-looking, expansive and sophisticated strategy for skills development'. It will be important to enable both colleges and universities to play a full part in the industrial strategy by recognising their local and regional roles and ensuring that they have the flexibility and incentives to act further.

In English city-regions for example, skills and industrial policy could be joined up with national strategy via 'shared power' models similar to that operating in health and social care in Greater Manchester. Such an NHS-style devolution agreement for skills policy and funding might work in a similar way (that is, national targets and funding mechanisms would remain intact, but cities could set strategy locally across 16-19 provision, adult skills budget, apprenticeships.

Recommendations:
Skills policy requires institutional and policy stability after decades of damaging instability. Cross-party consensus on supporting the framework adopted in the coming years will be critical to its success. To deliver both local and national industrial strategy objectives, closer working and co-operation is required between the DFE and BEIS, national and local authorities, and the HE and FE funding and regulatory systems.

Particular attention should be given to how spatial objectives in the industrial strategy are built into current and planned higher education reforms including the introduction of the Office for Students and the Teaching Excellence Framework. In general, more skills resources and powers (within stable national funding and curriculum systems) should be devolved to metro-mayors and combined authorities.

2.5 The research and innovation landscape

As we discussed in Chapter One the UK's R&D intensity is too low, and there is a now a consensus that it should be increased. Both Conservative Party and Labour Party manifestos at the 2017 general election supported a target for an increased R&D intensity, both aspiring to a target of 3 per cent of GDP.[62] This target is also supported by organisations such as the Confederation of British Industry (CBI) and the Royal Society. We agree with this consensus. However, a target is simply an indicator, not a guide to action, and achieving the target must not be seen as an end in-itself. We need to articulate what we want from the innovation that we hope will result from increased R&D; only then will it become clear how our mechanisms for supporting R&D need to be developed and changed.

It is worth remembering that now is not the first time that a target has been set for increased R&D intensity. It was one of the goals of the 2004-2014 Science and Innovation Investment Framework[63], which had as a target for overall R&D intensity 2.5 per cent by 2014, with an ambition to raise business R&D from around 1.25 per cent to 1.7 per cent. These targets were not met: R&D intensity rose from 1.53 per cent to 1.67 per cent between 2004 and 2007, but has since remained broadly static. Business R&D intensity has also not substantially changed.

61 Evidence submitted to the Commission from Professor Alison Fuller and Professor Lorna Unwin (UCL Institute of Education.

62 Labour committed to 3% by 2030, the Conservatives to 2.4% in 10 years with 3% as a longer term goal.

63 HM Treasury (2004) *Science & innovation investment framework 2004 - 2014* http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/spending_sr04_science.htm

Striving to achieve a particular target for R&D intensity is worthwhile. But it can only possibly be achieved via a comprehensive understanding of the whole R&D landscape in all its diversity, and the need for balance between its different components – those concerned with basic research, translational research, industrial development and wider types of innovative activity (some of which may not be included in formal R&D statistics). It is important to understand how these components fit together and support each other, so that we can identify the gaps and aim support at where it is needed to achieve the strategic goals of our industrial strategy. In particular, we need to understand the different roles of the public and private sectors and the way they can support each other.

Government support for R&D

There remains a strong consensus that most of the measures in the Science and Innovation Investment Framework were well-judged, and it is welcome that they have survived changes of government. The Framework began a period of real terms growth in government support for science through the science budget. This continued until the financial crisis, and while real terms growth was interrupted by the onset of the coalition's austerity programme, the science budget fared considerably better than many other aspects of public spending. The strategy for increasing business R&D intensity rested on the delivery of 'conditions of macroeconomic stability and the right regulatory frameworks for labour, product and capital markets which are conducive to business investment in R&D and the creation of wealth from innovation.'[64] In regulated industries like energy and water, the powers of the regulator were to be used to promote innovation and R&D.

The market failure argument for business underinvestment in R&D was the justification for policies of R&D tax credits and R&D grants: economic theory predicts underinvestment in R&D by firms, as they are unable to capture the full benefits of their investment, nor do they benefit from the beneficial spillover of business R&D to the wider economy. These government subsidies for private sector R&D have now become significant in scale; R&D tax credits cost almost £2.9 billion in 2015/16.[65] The cost in some measure reflects efforts by the authorities to prevent key businesses moving overseas. In addition, the 'Patent Box', a corporation tax break for profits depending on patented inventions which is largely directed at a small number of pharmaceuticals firms, was £652 million (in 2014/15).[66] The Patent Box has been criticised by the Institute for Fiscal Studies for its lack of effectiveness at incentivising new innovation[67], and by the European Commission as a form of race-to-the-bottom tax competition, forcing some amendments to the structure of the credit.[68] Even when not problematic for such reasons, R&D tax subsidy is, by its nature, generally unstrategic.

Chapter Six discusses the substantial *additional* subsidies given to equity investors in small, innovation intensive companies through schemes such as the Enterprise Investment Scheme and Venture Capital Trusts, and the government itself has become a very substantial direct investor in the venture capital sector.

It is of course, entirely likely that, without these policies, the innovation record of the UK would now be even worse. There are clearly many individual successes that have resulted from the last 13 years of UK science and innovation policy. Yet the fact must be faced that, as measured by the target the policy itself set of increasing R&D intensity, including business R&D, this policy has failed. If things are to be different this time, we need to understand why.

64 Ibid.

65 HMRC (2017) *Research and Development Tax Credits Statistics* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/644599/2017_RD_publication_commentary_final.pdf

66 HMRC (2017) *Patent Box: Statistics on uptake of the Patent Box* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/643860/Patent_Box_Statistics_2014-15.pdf

67 Miller, H. and Pope, T. (2016) 'Corporate tax avoidance: tackling Base Erosion and Profit Shifting', in *IFS Green Budget 2016* https://www.ifs.org.uk/uploads/gb/gb2016/gb2016ch8.pdf

68 Miller, H. (2013) 'EU Commission labels UK Patent Box harmful tax competition', *IFS Observations* https://www.ifs.org.uk/publications/6899

If the increase in support for public R&D had continued beyond 2010, this may well have driven further business R&D spending through the well-known 'crowding-in' effect: public R&D, by creating new knowledge, supplying skilled people, and connectivity to global business networks, creates opportunities that business R&D can exploit.[69] Thus the UK's low business R&D intensity is partly explained by low levels of government support for research.

In our opinion, however, there are more fundamental reasons underlying the failure of policy, over a decade and a half, to achieve the stated goal of making the UK a more R&D intensive economy. Policy has focused on the *supply-side* of science and innovation. Many of the resulting interventions have been positive, but the evidence suggests that we have reached the limits of this approach. Now we need to focus much more on the role of government in driving the *demand for innovation*, in pursuit of its strategic goals.

As we have already discussed, this will require a new approach to using the purchasing power of the government through procurement, with a recognition that governments can make markets where the private sector cannot, by taking on the role of 'lead customer' for new technologies as they are developed. This should involve instruments such as an expanded Small Business Research Initiative (SBRI) to drive innovation through R&D contracts to SMEs. The government has in fact asked David Connell to review the SBRI; this review is yet to be published, but Connell told us that:

> 'We must always remember that new STEM based businesses are created by entrepreneurs not research projects or collaborative grant programmes. The evidence suggests that paid developments for customers have played a much more important role than university IP and venture capital in the early stages of those companies that have created the most long-term jobs. SBRI contracts provide a way in which public sector organisations can participate in this process as problem owner, funder and customer... If we want to grow a new cohort of globally successful UK based industrial companies we must put much more emphasis on demand pull innovation programmes, like SBRI, to support this success model.'[70]

We endorse this call for more emphasis to be given to the demand-side of innovation. In later chapters we return to this issue in the specific contexts of energy and health.

Recommendation: A long-term commitment to raise the R&D intensity of the economy, measured as the ratio of R&D spend, should be accompanied by a more detailed understanding of the whole innovation system and the channels through which spending is translated into meaningful innovation. This will require intermediate milestones for both business and government/HE R&D intensity, supported by proposals for concrete interventions at a material scale, and with a new emphasis on demand-led initiatives to supplement the supply-side approach characteristic of the last 15 years of science and innovation policy.

69 Economic Insight Ltd (2015) 'What is the relationship between public and private investment in R&D?', report for the Department of Business, Innovation and Skills https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf

70 Evidence provided to the Commission by David Connell

Research and innovation agencies

The government spent £5.9 billion in 2016/17 supporting research and innovation through the science and research budget.[71] The 2016 Autumn Statement announced a substantial increase to this through the National Productivity Investment Fund, building up to an additional £2 billion by 2020-21.[72]

The institutional arrangements for delivering this support are going through a period of substantial change, following the Higher Education and Research Act 2017 which will create a new, single arms-length agency – UK Research and Innovation (UKRI) – to control this investment, with effect from April 2018. UKRI will bring together the research councils and the 'business-facing' agency InnovateUK.

The creation of this new structure offers a new opportunity to ensure that industrial strategy is effectively and appropriately supported by the science base. To succeed, it will require:

- Clarity of purpose for each of the components of the system – the individual research councils, InnovateUK, and Research England (providing institutional level support for research and knowledge exchange in England only), and for any new mechanisms that are introduced;
- Effective collaborative working between these individual components;
- Effective partnerships between the components and external partners, in the rest of government, in the private sector, and other stakeholders representing wider society;
- Clear and appropriate communications between the research agencies with government in both directions.

Under the Act, as components of UKRI, the research councils have (as one of three goals), 'contributing (whether directly or indirectly) to economic growth, or an economic benefit, in the UK'. InnovateUK has 'the purpose of increasing economic growth in the UK', through 'the need to support (directly or indirectly) persons engaged in business activities in the UK' and 'the need to promote innovation by persons carrying on business in the UK'. However, it is vital that the research councils strike the right balance between steering the research base in support of particular industrial strategy aims, and the imperative of supporting the unexpected in research. They will need to consider:

- How to support the existing business base to make the most of new technology (for example, in much more widespread use of digital technologies, automation and robotics in manufacturing);
- How to support the development of new technologies that may be the basis of new industries (for example in machine learning, nanotechnology, biotechnology and quantum technology);
- How to support the creativity of outstanding individual scientists and groups, as they explore new fields whose potential impact is entirely unpredictable.

InnovateUK has a more straightforward remit: it is 'business-led', which means that it supports the existing business base. It will be important to avoid an inappropriately linear view of innovation, in which InnovateUK is considered to be the exclusive intermediary organisation between the research base and business.

71 Department for Business, Innovation and Skills (2016) *The Allocation of Science and Research Funding 2016/17 to 2019/20* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/505308/bis-16-160-allocation-science-research-funding-2016-17-2019-20.pdf

72 HM Treasury (2016) *Autumn Statement, 2016* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/571559/autumn_statement_2016_web.pdf

This leaves a number of questions regarding the role of UKRI as the umbrella organisation:

- How can the decisions of UKRI be most effectively aligned with the priorities of a wider cross-government industrial strategy?
- How can the strong links that UKRI should develop with researchers and innovative businesses be most effectively exploited so that the industrial strategy can be informed, steered and kept up-to-date with new technological developments?
- How can the government exert a strategic steer on UKRI while respecting the independence of the research base?

The 'Haldane Principle' is held by many to be a quasi-constitutional principle upholding the autonomy of the research community and its immunity from direct political direction. The Higher Education and Research Act does bind the Secretary of State to a Haldane Principle, but it defines this more minimally as 'the principle that decisions on individual research proposals are best taken following an evaluation of the quality and likely impact of the proposals (such as a peer review process)'. A wider view of the Haldane Principle, which we support, would accept the right – and indeed the obligation – of the government to steer publicly-funded research in directions suggested by the wider strategic priorities of the state, while insulating it from more politically motivated short-term meddling.

UKRI's parent department will be the Department of Business, Energy and Industrial Strategy. As our discussion above suggests, it will be problematic if this is the only relationship it has with government. If industrial strategy is to be embedded across government, as we argue it should be, then there need to be direct relationships between all relevant departments and UKRI. The need for such wider relationships across government was strongly argued in the Nurse Review, on whose recommendation UKRI was set up. Sir Paul Nurse argued for a ministerial committee to fulfil this role, but there have been no signs of this happening.[73]

Developing strong relationships between UKRI and the Devolved Administrations and other devolved authorities will be crucial in addressing the profound regional imbalances in science and innovation spending as they impact regional economic imbalances. Currently there is a lack of coherence in the way UKRI has been setting up in this regard – although research councils and InnovateUK have a remit across the whole UK (and have historically explicitly avoided using any geographic criteria for awarding funding), the other component of UKRI – Research England – supports facilities for research and knowledge exchange in HE establishments in England alone, this function being devolved to funding councils in Wales, Scotland and Northern Ireland.

Recommendation: UKRI should inform, and be informed by, our proposed new industrial strategy division in HM Treasury. It is essential that there is a cross-government mechanism that has a two-way relationship with UKRI. The UKRI board should have a high-level advisory committee including representatives from all three Devolved Administrations, and from key local authorities with devolution deals.

73 Recommendation 10 of the Nurse Review: '*Government should develop new cross-Government arrangements to enable the discussion of strategic research priorities and funding of research, to provide a place for engagement between policymakers and research funders, and to put science at the heart of Government. It is recommended that a Ministerial Committee is established to perform these roles, although a reconfigured CST could possibly provide an alternative approach.*' See: Nurse, P. (2015) Ensuring a successful UK research endeavour: a review of the UK research councils, report for the Department of Business, Innovation and Skills https://www.gov.uk/government/publications/nurse-review-of-research-councils-recommendations

The European context

Substantial additional government support for the UK research base is steered through the European Framework Program[74] and support for R&D from European Structural Funds – this amounted to €8.8 billion between 2007 and 2013. The future of this funding is in question following the Brexit vote. Of course, it would be possible to replace this funding with domestic money following Brexit. But there are some broader arguments for maintaining the close integration of the UK research system with that of our European neighbours. Competition drives up standards in research, and the free flow of skilled people is a major mechanism for the diffusion of new ideas and new technologies.

In the context of industrial strategy, it is important to note that many of the challenges we describe as strategic goals of the state - especially decarbonising the energy system and meeting the healthcare challenges of an ageing population – are shared by other nations and their solutions will require international cooperation.

Recommendation: The UK should seek to maintain and enhance the international character of its research system, including through future participation in EU Framework Programmes, for example through associate country status.

The wider institutional landscape for R&D

Our interim report stressed the many different types of research and development institutions; this diversity of characteristics and missions is essential for a well-functioning national innovation system. It is the parts of the system that deal with basic research in academic or quasi-academic settings that have the highest visibility, but most R&D is done in institutions in the other categories. The balance between different types of institutions can vary over time and between different countries. For most of the post-war era, R&D in the UK was dominated by defence public sector research establishments (PSREs) and corporate laboratories.[75] Since 1980 these have been reduced greatly in importance as a result of changes in government policy (including the privatisation of some PSREs) and corporate governance[76], and university-based research has come to occupy a position which is proportionately larger than in most other research-intensive countries.

74 The Royal Society (2017) *UK Research and the European Union: the role of the EU in funding UK research* https://royalsociety.org/~/media/policy/projects/eu-uk-funding/uk-membership-of-eu.pdf

75 Edgerton, D. (2005) *Warfare State: Britain, 1920–1970*. Cambridge: Cambridge University Press.

76 Jones, R.A.L. (2013) 'The UK's Innovation Deficit & How to Repair it' *SPERI Paper No.6* http://speri.dept.shef.ac.uk/wp-content/uploads/2013/10/SPERI-Paper-No.6-The-UKs-Innovation-Deficit-and-How-to-Repair-it-PDF-1131KB.pdf

A typology of Research and Development institutions

Research and Development takes place in different kinds of institutions, which differ in their missions and roles within an overall national innovation system. Some examples of these different types of institution include:

- **Universities.** Here research, often but not always basic in character, driven by disciplinary/academic priorities, is carried out, usually with support from research councils, in parallel with undergraduate and postgraduate teaching.
- **Publicly supported basic research institutes**. Research driven by disciplinary/academic priorities, largely government supported. E.g. Max Planck Institutes in Germany, the Francis Crick Institute (UK).
- **Public sector research establishments (Civil).** Research directly supported by government driven by non-defence state priorities. E.g. Health and Safety Laboratory, Meteorological Office, National Institute for Standards and Technology (USA).
- **Public sector research establishments (Defence).** Research directly supported by government in support of defence (though often with an aspiration to create marketable civil technologies as spin-offs). E.g. Los Alamos National Laboratory (USA), Defence Science and Technology Laboratory, Porton Down (UK).
- **Public sector translational research institutes**, with strong private sector partnerships. Government run laboratories with a primary mission to support innovation in the private sector. E.g. ITRI (Taiwan), Fraunhofer Institutes (Germany).
- **Private sector contract research organisations**. Private sector (including not-for-profit) laboratories dependent on R&D contracts from both the public and private sectors. E.g. SRI International (USA), Battelle Memorial Institute (USA).
- **Corporate research laboratories** carrying out strategic/long-ranged research. Laboratories supported by large companies carrying out long-ranged, speculative research. E.g. Bell Laboratories (pre 1996, USA), Google X Laboratory (USA).
- **Product focused company R&D laboratories**. Private sector R&D focused on existing or planned products and services, including both large companies and spin-outs.

Laying the Foundations– First Report of the Industrial Strategy Commission[77]

If the UK is to increase its R&D intensity, it will need to be conscious of the whole of this innovation landscape. It would be a mistake to expand one part of the system in an unbalanced way. Instead, we need to think of the innovation landscape as a whole. It will be important to pay attention not just to individual institutions, but to the relationships between the different parts. This includes relationships between university research, business research, and venture capital funded spin-outs.

The Manchester Institute of Innovation Research has highlighted how 'industrial innovation is organised in systems, or ecosystems, that follow the evolution of specific technologies/services – meaning companies can be involved in multiple systems'. The new strategy must understand the flows and exchanges of knowledge, people, finance and services that innovation ecosystems are based on.[78]

77 The Industrial Strategy Commission (2017) *Laying the Foundations* http://industrialstrategycommission.org.uk/wp-content/uploads/2017/07/Laying-the-Foundations-the-Industrial-Strategy-Commission.pdf

78 Manchester Institute of Innovation Research (2017) *Submission to the Government's consultation on the Green Paper: Building our Industrial Strategy* https://mioirblog.wordpress.com/2017/04/24/industrial-strategy-consultation-institute-response/.

The industrial strategy must be mindful of changes within the wider R&D institutional landscape – and seek to build upon the opportunities that arise. Recent years have seen a number of changes in the institutional landscape in the UK, with a number of new research institutes being established, and more being proposed. New research institutes have been established to pursue basic research – notably the Francis Crick Institute. Other new centres include the National Graphene Institute, the Alan Turing Institute, the Sir Henry Royce Institute and the Rosalind Franklin Institute. A series of translational research institutes - the Catapult Centres - have been founded, on the explicit model of Germany's Fraunhofer Centres. These are currently under review.

As new institutes are established, it becomes important that they have clarity of mission. It must be clear where they sit on the spectrum from basic research to translation, and how success is to be judged - for example, whether by international scientific reputation and publication of high-impact outputs, by assistance given to established technology-intensive companies, by technology diffusion amongst less technology-intensive firms, or by the production of de-risked and investable propositions for spinning out and receiving venture capital funding. There must be a clear understanding of the appropriate business model for each institution, balancing any obligation to earn a commercial return (e.g. from commercial contracts and intellectual property licensing) with the degree to which they support open innovation.

In addition to new institutions, there is now interest in new delivery mechanisms for research funding. In particular, the new Industrial Strategy Challenge Fund (ISCF) has the potential to create new ways of initiating and funding fruitful public-private sector partnerships to develop research in support of the strategic goals of the state.

As always, there is a temptation to look abroad for models to emulate, and there has been much interest in the USA's Defense Advanced Research Projects Agency (DARPA). We caution that the success of DARPA in certain specific areas of innovation (the Internet and GPS) may not be easily replicated in the UK's environment, with its different innovation ecosystem.

DARPA's success is related to the clarity of its strategic mission - the requirement to maintain the absolute technological superiority of the US Armed Forces. The technologies ascribed to it were only developed with substantial additional effort - particularly at the development end of R&D - by other agents, especially private sector R&D. Nonetheless, there are lessons about the need for able and strongly empowered programme managers, the importance of private sector contract research organisations, and above all the focus on challenge led research. The task will be to identify challenge areas with a high degree of focus and alignment with the UK's big strategic goals.

Recommendation: The new strategy should be designed with a comprehensive understanding of the whole R&D landscape and the relationships between its different parts. New institutions must have clarity of mission and be judged by the appropriate metrics.

3. Investment in Infrastructure

The productivity of every company in the country, and the standard of living of every individual, is affected by the quality of the infrastructure that people and businesses can access. Infrastructure should be thought of in terms of assets of all kinds, physical, natural and human; it is not just concrete or even fibre, but includes human capital and natural capital. According to Professor Graham Winch of the Alliance Manchester Business School, 'National infrastructure can be defined as the portfolio of assets which underpins the productive activity of the nation by providing essential infrastructure services to other sectors.'[79] It is conventionally thought of as 'hard' assets, long-lived and capital intensive; we include 'soft' infrastructure too.

Hard infrastructure investments inevitably involve the state, even when privately planned and financed, because of the long time horizon, major externalities, planning requirements, and need for regulation of natural monopolies. In his evidence submission, Professor Winch said infrastructure assets: '[H]ave a number of very distinctive characteristics which … entail various kinds of market failure which implicate governments in their provision and use. The key questions for policy revolve around how government should be involved, not whether government should be involved.'

In *Laying the Foundations*, we concluded that ensuring there is adequate investment in infrastructure to meet our current and future needs and priorities should be one of the immediate strategic priorities for industrial strategy. As the submission from the Centre for Urban and Regional Development Studies (CURDS) at the University of Newcastle put it: 'Governments need to move towards more thoughtful, longer-term, evidenced-based and strategic thinking about how public bodies, at all geographical levels, can work towards desired outcomes including improved productivity, higher levels of economic growth, and reduced social and spatial disparities.'[80]

Strategic management of the economy should aim to encourage excellence among our most productive companies and in our most dynamic places, and to ensure the benefits of a successful economy are shared fairly. As such we propose a Universal Basic Infrastructure commitment alongside the necessary investment in infrastructure projects to enhance the performance of the most productive businesses. The provision of a Universal Basic Infrastructure includes both hard (physical and natural capital) and soft (human capital-building) infrastructure.

We also propose a more devolved relationship between central government and sub-national decision makers. Much infrastructure is spatially specific, as evidence submitted to us pointed out. It is not only fixed assets; human capital – *people* – also tends to stay in one town, city or region for long periods. The information needed to make strategic decisions is only available locally and those decisions are best made by people who understand local needs.

Finally, the level of investment in infrastructure in the UK must increase, which implies additional sources of financing.

79 Evidence submitted to the Commission by Graham Winch, Alliance Manchester Business School, The University of Manchester

80 Evidence submitted to the Commission by CURDS (submission by Peter O'Brien, Stuart Dawley, Danny MacKinnon, Andy Pike and John Tomaney).

Universal Basic Infrastructure

The challenge to ensure there is adequate investment in our infrastructure is significant. As infrastructure investment is long-term, it is an area of economic strategy that sits least comfortably with short-term political ambitions and pressures. In addition to the needs of new technologies, there are several areas where the UK's existing 'hard' infrastructure is acknowledged either to be weak or to need significant investment in the next 10-20 years, including:

- Rail
- Energy
- Water and flood defence
- Fixed and mobile broadband and fibre

There are specific infrastructure needs associated with investment in new technologies and their diffusion. This includes electric and autonomous vehicles, but more broadly the UK's lamentable fixed and mobile broadband infrastructure. As Professor Dieter Helm has commented, 'Few would locate in Britain because of the attractiveness of its existing network infrastructures. Few will be attracted by the state of its broadband.'[81] The physical and natural capital infrastructure map needs rethinking in terms of both looming challenges, such as climate change and dangerous air quality, or ageing; and also in terms of existing weaknesses such as low productivity outside London and the South East.

In addition, the UK's 'soft' infrastructure, or in other words investment in human capital through universal education and health and social care services, also faces significant challenges. Addressing shortfalls in soft infrastructure will be an important aspect of improving living standards and economic potential in towns and areas that are not going to be part of a high-productivity urban agglomeration.

We believe access to sufficiently high quality (soft and hard) infrastructure should be considered as universal service obligations, the minimum the state should offer all its citizens in all places, and more important than monetary incomes in terms of delivering the capabilities for economic development to all people and places. After all, even with higher benefits or a basic income, no individual can buy a transport network or high quality education system for their town or city. A Universal Basic Infrastructure commitment is essential, with the principle of universality translating into distinctive local needs and with local specialisms developed in addition.

We have argued that industrial strategy should not seek to do everything everywhere but it should seek to do something for everywhere. All places in the UK should be served by high quality hard infrastructure and have access to high quality human capital-building universal services. Infrastructure provision in too many places is currently substandard – whether this is under-performing schools or hospitals, inadequate or absent bus services, poor broadband or mobile coverage, the outcome is the same which is to undermine the productive capacity of our people, businesses and public services. A new industrial strategy should commit to this provision which would we believe have a significant impact on the lives of most people and contribute positively to improving the UK's overall productivity.

Providing a Universal Basic Infrastructure commitment obviously increases the financial challenge. To deliver the long-term infrastructure investment businesses and people need in order to prosper in the future will require more money, some private, and some from taxation and government borrowing. There is no correct number, although the UK compares unfavourably to most other OECD economies in the amount it invests strategically for the future. How much

81 Helm, D. (2017) *'Policy by lists – the Green Paper and the new industrial strategy'* http://www.dieterhelm.co.uk/regulation/regulation/policy-by-lists-the-green-paper-and-the-new-industrial-strategy

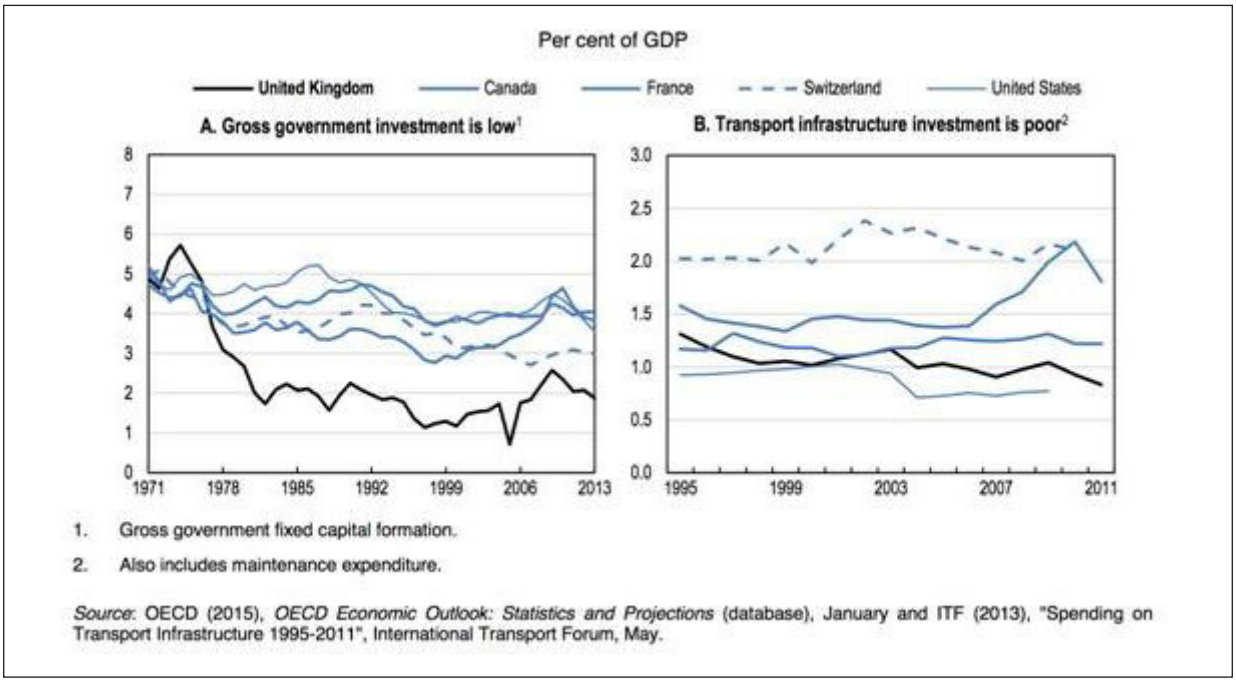
should be spent on additional infrastructure investment, and the extent to which government spending in particular should increase, is a political choice that should be justified to, and held to account by, voters. If the choice is to limit the increase, there is a further choice about how much to reallocate current funding. However, this is probably the most fundamental decision facing national politicians at present: how much do politicians (and voters) care about social and spatial inequality in our country? How sincere is the political commitment to laying the foundations for sustained growth around the UK? As we stated in Chapter One a new industrial strategy should be formed through a consideration of these questions.

Recommendation: The new industrial strategy should commit to providing Universal Basic Infrastructure for all citizens in all places. Everywhere in the UK should be served by high quality hard infrastructure and have access to high quality human capital-building universal services.

The amount of infrastructure spending in the UK

According to the OECD, there has been 'protracted underinvestment' in infrastructure in the UK and public infrastructure investment has been markedly lower in the UK than in its peers.[82] This has directly affected economic activity and people's well-being. It has reduced the amount of foreign direct investment compared with what it might otherwise have been; surveys consistently show poor infrastructure as one of the negative factors influencing investors. The OECD also notes the role of infrastructure in contributing to the UK's regional disparities.

Figure 3.1: Infrastructure spending in the UK, Canada, France, Switzerland and United States[83]



82 Pisu, M., Pels, B. and Bottini, N. (2015) 'Improving Infrastructure in the United Kingdom', *OECD Economics Department Working Paper, No. 1244* http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP(2015)62&docLanguage=En

83 Figure 3.1 reproduced from *OECD Economics Department Working Paper, No. 1244*, p.8

The comparison is affected by the UK's privatisations during the 1980s (although the level of government spend had fallen sharply before they occurred). The OECD notes that these network sectors became more efficient, although cautioning that comparisons are difficult. The Armitt Review concluded there were insufficient incentives to deliver long-term investments, as well as cross-sector co-ordination.[84] In their response to the Armitt Review, the Royal Academy of Engineering stated, 'There are some aspects of infrastructure planning, such as maintaining a coherent strategic vision within and between sectors, which cannot be subcontracted to the private sector.'[85] The National Infrastructure Commission has also highlighted the need for an overarching vision for infrastructure.[86] The focus on new projects in the UK means in addition that maintenance and the continuing delivery of infrastructure services is overlooked, a point just beginning to be acknowledged.[87] The quality of the assets leaves a lot to be desired. The Institute of Chartered Accountants in England and Wales, for example, called the annual UK investment of £11billion in road, rail and local transport 'surprising', as in surprisingly low.[88] In a survey of infrastructure quality worldwide, the UK ranked 27th, lower down the league table than might be hoped for a G7 economy facing substantial economic challenges.

Financing infrastructure

Increasing the amount of spending on infrastructure projects inevitably raises the question of finance. Given the limitations of Private Finance Initiative (PFI), and the impact of direct government funding on the deficit, new financing methods will be needed. The regulated asset base (RAB) approach to utilities, defining the assets needed to run the business in a natural monopoly, is an important innovation, which can and should be more widely used, having been applied to Highways England and Network Rail. This model represents a more efficient use of capital than PFI or public-private partnership (PPP) schemes.[89]

Other financing possibilities need to be considered. An Infrastructure Bank is probably desirable in itself and may become essential, depending on the UK's post-Brexit relationship with the European Investment Bank (EIB).[90] There are similar institutions in many countries, such as Infrastructure Australia, KfW in Germany and NTMA in Ireland. Canada has just established one.[91] It is hard to believe a country like the UK with a sophisticated financial sector could not operate a public infrastructure bank just as well.

84 Armitt, J. (2013) *The Armitt Review: An independent review of long term infrastructure planning commissioned for Labour's Policy Review* https://www.policyforum.labour.org.uk/uploads/editor/files/The_Armitt_Review_Final_Report.pdf

85 Royal Academy of Engineering (2013) *Submission of evidence to the Independent Armitt Review of Infrastructure* http://www.raeng.org.uk/publications/responses/independent-armitt-review-of-infrastructure

86 National Infrastructure Commission (2017) *Congestion, Capacity, Carbon: Priorities for National Infrastructure* https://www.nic.org.uk/wp-content/uploads/Congestion-Capacity-Carbon_-Priorities-for-national-infrastructure.pdf

87 Infrastructure Client Group, Institution of Civil Engineers (2017) *From Transactions to Enterprises: A New Approach to Delivering High Performing Infrastructure* https://www.ice.org.uk/getattachment/disciplines-and-resources/best-practice/project-13-from-transaction-to-enterprises/ICE_REPORT_V6_22_03_17_Pages_Digital.pdf.aspx

88 ICAEW (2017) *Managing the Public Balance Sheet* https://www.icaew.com/-/media/corporate/files/about-icaew/what-we-do/policy/public-finances/policy-insight-managing-the-public-balance-sheet.ashx

89 Helm, D., Wardlaw, J. and Caldecott, B. (2009). Delivering a 21st Century Infrastructure for Britain, *Policy Exchange* https://policyexchange.org.uk/publication/delivering-a-21st-century-infrastructure-for-britain; OECD (2015) *The Regulatory Asset Base Model and the Project Finance Model: A Comparative Approach* http://www.oecd-ilibrary.org/docserver/download/5jrw13st0z37-en.pdf?expires=1505206714&id=id&accname=guest&checksum=8362330340B30D725445511A64B21F10

90 The National Infrastructure Commission is currently consulting on options should the UK lose access to European Investment Bank (see page 190-192) https://www.nic.org.uk/wp-content/uploads/Congestion-Capacity-Carbon_-Priorities-for-national-infrastructure.pdf

91 For further information on the Canada Infrastructure Bank see: http://www.infrastructure.gc.ca/CIB-BIC/index-eng.html

Dieter Helm and colleagues previously suggested that such a body should include the separate public works loan board (PWLB), the Treasury infrastructure finance unit (TIFU) and Partnerships UK (PUK), the relevant bodies at the time.[92] Although there has been some institutional progress with the creation of the Infrastructure and Projects Authority, there remains a strong case for a single body. Its focus should be the early construction stage of projects. Such a bank could crowd in private investment through a government guarantee without directly adding to the public borrowing requirement,[93] and could provide significant additional support for long-term investment through reinvesting all its profits. The UK government has been willing to provide such infrastructure loan guarantees on a small scale in the recent past.[94]

Recommendations:
The UK should commit to a higher level of infrastructure spending. There should be more direct investment by the government, but also newer sources of finance. In particular, we believe the regulated asset base (RAB) approach to utilities, should be more widely used.

The UK should establish a public infrastructure bank which could crowd in private investment through a government guarantee and provide significant support for long-term investment through reinvesting all its profits.

The authors of the submission from CURDS advocate extended borrowing powers for local and combined authorities (e.g. via the Public Works Loan Board), a wider range of local tax instruments to increase the tax base and fiscal capacity (such as land value tax, tourist taxes, local income tax); and extending appropriate discretion for local fiscal incentives for investment (such as tax reliefs or capital allowances). Many of these will be an anathema to national politicians and the Treasury alike; but there is no strong economic case against limited local borrowing for investments delivering a reasonably stable utility-like return and limited local tax powers. For instance, it is hard to see why UK cities attractive to tourists and business visitors are unable – almost uniquely in the western world – to set a local *taxe de sejour*. There will always need to be substantial flows of tax revenues from richer to poorer areas, and there are limits to how much local tax bases can expand, but given the extreme centralisation of UK government finances compared to other countries, the economic and political case for further fiscal devolution will build, and needs to be planned for now.

The key soft infrastructure investments that form part of the Universal Basic Infrastructure guarantee, health and education, are discussed in more detail in Chapter Two and Five. Clearly, they are largely central government funded in the UK, so expanding provision inevitably involves either increased expenditure, tax-financed in the current context of an already large budget deficit, or reprioritisation. This is one of the difficult choices involved in taking a strategic approach to the economy. Difficult choices are bound to be political. The question for voters and politicians is how seriously the UK takes the issue of so many places in our country not sharing in either past or prospective future economic growth. Looking at what has happened in the past decade since the financial crisis – or even longer since the deindustrialisation of the 1980s and 90s – we believe the time has come to commit to Universal Basic Infrastructure, with all that implies.

92 Helm, D., Wardlaw, J. and Caldecott, B. (2009). Delivering a 21st Century Infrastructure for Britain, *Policy Exchange* https://policyexchange.org.uk/publication/delivering-a-21st-century-infrastructure-for-britain.

93 Although it does create a contingent liability as well as a public infrastructure asset.

94 HM Treasury press release (2012) 'Chancellor and Chief Secretary unveil new UK Guarantees scheme to dramatically accelerate major infrastructure investment' https://www.gov.uk/government/news/government-uses-fiscal-credibility-to-unveil-new-infrastructure-investment-and-exports-plan

Recommendation: There is a strong case for devolution of both decision-making and fiscal powers. We recommend the introduction of limited borrowing powers for local and regional authorities and limited local tax powers.

Appraisal of major investments

The implementation of current methods of appraising public investments needs to be changed: existing approaches disproportionately benefit the parts of the UK where the economy is already strong, and they do not properly account for the productivity gains that systemic intervention in regions with weaker economies should aim for. It is clear there are strong forces that amplify already existing patterns of regional advantage and disadvantage – the 'Matthew effect'[95], a winner-takes-all dynamic. What is required is a systematic effort to identify explicitly these forces, to question whether this amplifying effect is what was intended, and when the consequences were indeed unintended, to redesign the process or devise countervailing interventions.

A number of submissions identified this process, which amplifies the inherent self-reinforcing dynamic of agglomeration. As Professor Winch expressed it: 'A major issue here is that the investment appraisal methods used to select asset development projects at the national level tend to follow rather than stimulate economic activity. That is, the benefit side of the benefit-cost calculus is largely function of the existing level of economic activity in the region, and does not fully take into account the stimulus effects of the investment on the region – either during construction or operation. Thus, investment will always be higher in the faster growing regions thereby reinforcing that growth and exacerbating regional imbalances.'[96]

In principle, potential public sector investments must be carefully appraised, and the UK has long been at the forefront internationally in applying cost benefit techniques to government projects, the practice set out thoroughly in the Treasury Green Book. The Green Book does in fact give significant leeway for decision makers to incorporate wider benefits and strategic aims. Yet the results have been disappointing, which suggests the problem is one of overly-rigid interpretation of the rules.

In practice, the appraisals looking at costs and benefits projected into the future apply in a rather mechanical way a methodology designed for marginal and linear changes to investments that are intended to bring about non-linear or non-incremental change. This is an issue affecting major projects. For example, a big infrastructure project whose aim is to bring about economic development involving changes in commuting patterns or the location of certain supply chains would be under-valued by standard cost-benefit analysis methodologies. Although such future benefits are more uncertain than incremental changes, they have a strongly self-fulfilling character. The errors in appraisals from applying the standard methodology to non-linear contexts can be large, both because relative prices may change and because large projects can have big effects on aggregate economic output.[97]

95 The 'Matthew effect' was coined by Robert K Merton in 1968 and refers to the parable of the talents in the Gospel of Matthew (25:29) in the New Testament: *'For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken even that which he hath.'*

96 Evidence submission by Graham Winch, Alliance Manchester Business School, The University of Manchester.

97 Dietz, S. and Hepburn,C. (2013) 'Benefit-cost analysis of non-marginal climate and energy projects' *Energy Economics*, 40, 61-71; The errors arise from the curvature of the utility function, which for ranges that are empirically plausible, makes the linear first order Taylor expansion for the stream of future utilities a poor approximation. The elasticity of the utility function depends on preferences for inter-temporal substitution, aversion to risk, and aversion to (spatial) inequality.

However, the Treasury's 'Green Book' rules out the possibility of step changes in behaviour, stating firmly that the assessment of costs and benefits must be based on market prices (taking account of taxes), although it does permit the inclusion of 'wider' benefits and costs such as environmental externalities.[98] The Green Book methodology needs review, as at present no official will ever dare consider an investment project's potential for non-incremental benefits.

There is no definitive rule as to when the incremental approach to a project appraisal will be misleading. However, context is clearly relevant to the likelihood of significant changes in relative prices or aggregate consumption. For example, upgrading rail links to better connect cities and towns across northern England in a single labour market by reducing commuting times is an obvious example of investment with potentially large and non-incremental outcomes, whereas upgrades to existing commuter lines into London, with a dense existing network of different commuting options, are clearly only incremental.

The existing practices do not systematically capture externalities and spillovers either, although progress has been made in trying to assess 'wider economic benefits'. This includes agglomeration effects; output changes in imperfectly competitive markets; impacts on labour supply; and change in the productivity of jobs.[99] The last two of these are valued in terms of the additional tax revenues due to the change in labour supply. Although there has been extensive research on this area in recent years, there is not yet settled doctrine. However, the key point is that the focus of appraisal should be the potential for economic development over time, not the narrow net benefits of a single project.[100]

Just as important is the fact that appraisals of potential benefits reflect the existing level of economic activity in a region, and do not fully take into account the stimulus effects of the investment – either during construction or operation. Thus the use in appraisals of prevailing market prices, such as existing wage rates and the tax revenues they are likely to generate, or current house prices. However, the value of time saved thanks to, say, a faster train journey between Sheffield and Manchester at prevailing wage rates will be lower than its value at wage rates in new, higher productivity equilibrium. Benefits are calculated by looking the existing level of economic activity and market prices such as land and wages. They do not incorporate any further effects of the proposed investment on the region. Faster-growing regions will get more and more investment, and the procedure will steadily worsen regional imbalances.

Having pointed out the significant shortcomings of standard appraisal techniques, there is substantial resistance among officials to any departure from current practice. A very good reason for this is the fear of opening the flood gates to the power of lobbying and short-term political considerations in deciding on major investments. However, the big decisions are hardly scientific. A strict cost benefit analysis approach would prioritise maintenance and small road improvement schemes, whereas big projects are politically more appealing and get the go ahead. Nobody would argue that decisions such as London airport expansion or HS2 – both outside the remit of the National Infrastructure Commission – are not of political interest. Equally, Ofcom's decision not to split Openreach from BT did not prioritise the national infrastructure need.[101]

98 HM Treasury 'The Green Book: Appraisal and Evaluation in Central Government', see para 5.11, and Annex 2 https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

99 Department for Transport (2005) *Transport, Wider Economic Benefits and Impact on GDP*. Discussion Paper http://webarchive.nationalarchives.gov.uk/+/http:/www.dft.gov.uk/pgr/economics/rdg/webia/webmethodology/sportwidereconomicbenefi3137.pdf

100 Metz, D. (2016). *Travel Fast or Smart? A Manifesto for an Intelligent Transport Policy*. London Publishing Partnership: London.

101 Helm, D. (2017) *'Policy by lists – the Green Paper and the new industrial strategy'* http://www.dieterhelm.co.uk/regulation/regulation/policy-by-lists-the-green-paper-and-the-new-industrial-strategy

There is no getting away from the need for judgment in infrastructure investment decisions. Part of the reason for the self-fulfilling dynamic of the past 40-50 years has been the aversion to anything other than a purely mechanical process. But judgments can be systematic and evidence-based. It is straightforward to sense check appraisals that depart from the current practice, for example by incorporating a judgment about a productivity uplift of the result of a specific project that increases the potential benefits. If any such assumptions are totally implausible, it will be apparent. Paying attention to local information is essential. The CURDS evidence pointed out that the lack of enough co-ordination between national and local decision makers has contributed to previous failures of projects to deliver anticipated productivity benefits: 'The risks are that a national strategy is designed in a top-down, centralised and spatially-blind way, and rolled-out with limited alignment and ability to connect with initiatives, investments and effective delivery at sub-national and local levels.'

The institutional framework for taking strategic investment decisions, and how it meshes with the expert analysis of the National Infrastructure Commission, the National Infrastructure Plan, the Natural Capital Committee, and the Infrastructure Planning Commission, as well as the National Audit Office, will be an important factor in mitigating against the risk of regulatory or political capture of infrastructure investments. We have discussed the institutional framework, including national-local co-ordination, in Chapter Two.

Recommendation: Infrastructure appraisal methods and practice for strategic projects should take account of potentially large changes in behaviour. In particular, the agglomeration effects and regional distribution of spending must be taken properly into account. There should also be more evaluation of big projects after they have been in operation for a time, to inform future appraisals.

Market structure in key sectors

The privatisation of rail, energy, water, and BT makes the market structure of these key hard infrastructure utilities an important consideration in the delivery of future infrastructure investment. All have remained politically contentious because of the difficulty of achieving competition in the market; and there has been frequent policy change militating strongly against long-term investment.

After an initial period when the privatised companies clearly delivered greater efficiency and higher quality and/or reduced prices for customers, the benefits of privatisation have come to seem more nuanced. This is apparent in issues such as the ongoing (and cross-party) concern about energy prices and generating capacity, including a major Competition and Markets Authority (CMA) market inquiry; the inadequate maintenance of the water supply network and questions raised about the implications of the water companies' leveraged and complex financial structures for future investment;[102] and the debate about whether Ofcom's decision on legal ringfencing Openreach within BT will be enough to incentivise appropriate fibre investment.

102 Bayliss, K. and Hall, D. (2017) Bringing water into public ownership: costs and benefits, *Public Services International Research Unit, University of Greenwich* http://gala.gre.ac.uk/17277/

There are three inherent features of these markets that make their regulation vital if the UK is to get the long-term investment in infrastructure we need.

- they are natural monopolies in core parts of their business
- the investment needed is large and lumpy, and big projects will often require government guarantees
- there are vital universal service requirements and affordability considerations.

The existing regulatory framework has some strengths but we recommend reforms (which we will return to later in Chapter Seven):

- to recognise the interdependence of the government and private sector
- to bring far greater consistency of regulatory approach and
- to ensure that the public sector support and the privilege of operating monopolies is reflected in a return for the public and investment for the long-term benefit of the economy.

Recommendation: The regulatory framework for privatised utilities needs reform. Consideration should be given to replacing the sector regulators for the network industries with a single body, sitting within the Competition and Markets Authority (CMA), with a remit to include investment incentives in its criteria for regulation. Sectors need to be regulated more consistently.

4. Decarbonisation of the energy economy

Ensuring the availability of a secure and reliable energy supply is a central concern of the state; almost all aspects of the operation of a modern society depend on this. So a key element of industrial strategy must involve supplying an effective energy infrastructure, for the generation of electricity, and the distribution of electricity and gas.

But at the present time, we are seeing rapid change in the technology and economics of energy – and we have a pressing need for that change to be even more rapid, as the pressure of climate change means that we need to decarbonise our energy supply. In 2016, 82 per cent of our primary energy inputs were in the form of fossil fuels.[103] Wind and solar have grown very fast, but from a low base, and still supply less than 16 per cent of our electricity, representing less than 3 per cent of our total final energy consumption (it is important to remember that we only consume 18.5 per cent of our energy in the form of electricity, as opposed to directly burnt oil and gas). Further rapid expansion of wind and solar is both likely and desirable, but this will bring problems from intermittency, and geography and economics will impose limits on the total capacity.

The UK has managed to reduce its carbon emissions significantly, but we have now largely banked the easy carbon savings obtained by switching from coal generation to gas. The largest contribution to our low carbon energy supply comes from nuclear, where problems lie ahead. Nuclear generating capacity currently supplying about 17% of our electricity comes from the ageing Advanced Gas-cooled Reactor (AGR) fleet, which will have been taken out of service by 2030, emphasising the urgency of the delayed nuclear new build programme.

Increasing market penetration by electric vehicles will reduce the demand for oil for transportation in the medium term. Currently oil accounts for a bit less than one quarter of our primary energy consumption, with 40.4 million tonnes (oil equivalent) used for road transport alone. The use of electric vehicles is rising fast – but from a very low base. Although electricity use by electric vehicles rose by 33 per cent from 2015 to 2016, their energy consumption - 129 GigaWatt-Hour (GWh) (corresponding to 11 thousand tonnes oil equivalent) - displaced only a fraction of a percent of the demand for oil for transport. Nonetheless as penetration by electric vehicles rises further, this will put more pressure on the capacity of the electricity generating and distribution system.

Thus the prospect of decarbonising our energy system remains a distant and challenging goal. The urgency of the climate change problem demands that we take it seriously, but this will require enormous technological innovation and system change, which need to take place after a long period of underinvestment. Driving this change and ensuring that UK industry benefits from it should be a primary goal of industrial strategy.

The energy transition we need to make to an affordable, low carbon future is enormously challenging, yet it also offers huge opportunities for UK industry to develop innovative new products and services. Done right, an industrial strategy for energy should deliver two goals - securing affordable low carbon energy at the same time as improving productivity and economic growth across the country.

103 This statistic, and all subsequent statistics on energy use in the UK in Chapter 4, comes from: Department of Business, Energy and Industrial Strategy (2017) *Digest of UK Energy Statistics 2017* https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2017-main-report

Rethinking UK energy policy

The government's strategic goals for energy are simply stated. They are:

- to decarbonise the energy economy, achieving an 80 per cent reduction in CO2 emissions by 2050
- to ensure a secure and reliable supply of energy
- for that energy to be affordable – and in particular, affordable enough not to compromise economic growth.

In response it can equally be simply stated: it is not possible to deliver all three of these goals with current policies and technologies.

The Climate Change Act commits the government to the goal of an 80 per cent CO2 emissions reduction by 2050, with intermediate carbon budgets to stage progress. From 2023-2027 (the 4th carbon budget) the government is projected to begin missing these targets[104]Through the Climate Change Act, the government has (rightly) willed deep decarbonisation as an end, without yet willing the means.

Moreover, the existing state of energy infrastructure is not adequate: the prominent energy economist Dieter Helm writes:

> 'The energy sector is not in good shape. It is not fit for the purposes of a major industrial economy, and especially for one doing BREXIT .... The years of investment neglect are being played out just when all the coal is closing, the existing nuclear fleet is aging, existing gas power stations have taken a severe bath, and new nuclear is getting later and later.'[105]

Recent years have seen a swing from a philosophy of leaving energy supply to the market to one of much more state control. This shift has taken place in a piecemeal fashion, but the outcome has been a situation described by Helm thus: 'Every single investment in electricity generation in this country is determined by the state. It comes with either a capacity contract or a feed-in tariff.'[106]

Given that radical change is required, and that the government now effectively finds itself in complete control of the energy sector, a more purposeful strategy is now required that drives the creation of the new energy technologies we need in a way that benefits, not just the domestic and industrial consumers of energy, but the UK energy industry itself. The merger of the Department of Energy and Climate Change (DECC) with the Department of Business, Innovation and Skills (BIS) to form the Department of Business, Energy and Industrial Strategy (BEIS) offers a new opportunity to connect industrial strategy and energy policy much more closely than has been the case in the recent past. The recently published Green Growth Strategy represents an important first step in the right direction.[107]

104 HM Government (2016) *Government response to the Committee on Climate Change: Progress on meeting carbon budgets* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/559954/57204_Unnumbered_Gov_Response_Web_Accessible.pdf

105 Helm, D. (2016) 'Greg Clark's energy agenda', *Energy Futures Network: Paper 20* http://www.dieterhelm.co.uk/energy/energy/greg-clarks-energy-agenda

106 Statement taken from evidence given by Dieter Helm to the House of Lords Select Committee during their 2016 inquiry on the economics of UK energy policy, see: http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/economic-affairs-committee/the-economics-of-uk-energy-policy/oral/36241.pdf

107 Department for Business, Energy and Industrial Strategy (2017) *The Clean Growth Strategy: Leading the way to a low carbon future* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/651916/BEIS_The_Clean_Growth_online_12.10.17.pdf

Recommendation: The government should seize the opportunity arising from the merger of DECC and BIS to fully integrate energy policy into a new industrial strategy.

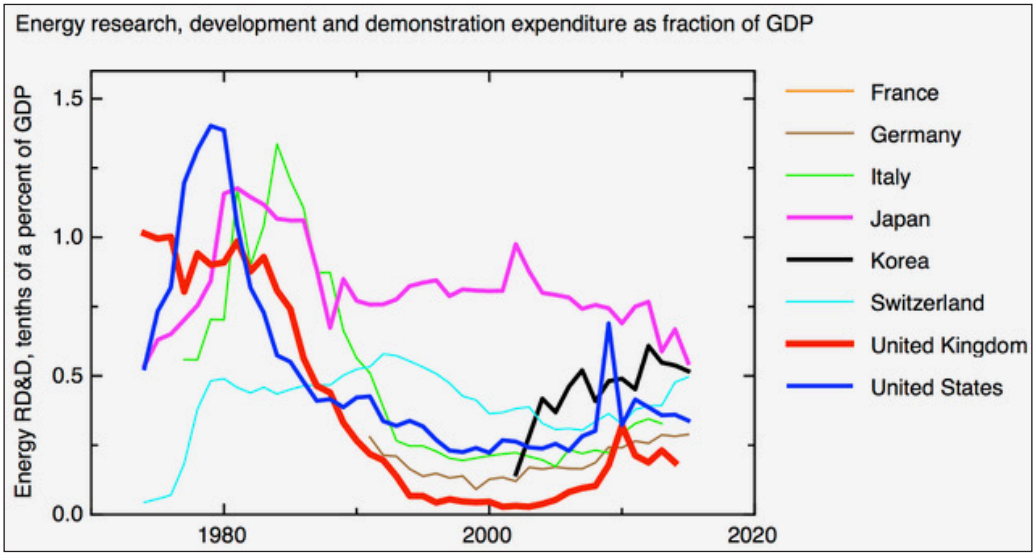
Getting serious about energy R&D

One critique of energy policy to date is that it has relied heavily on very large subsidies to implement existing low-carbon energy technologies, and that it might have been more cost effective to emphasise lower cost, partial decarbonisation in the short-term, ramping up the implementation of zero-carbon technologies after further technological progress has reduced their costs further. Thus the government's welcome commitment to phase out unabated coal generation by 2025 would be accompanied by an understanding that some of this capacity would need to be replaced by gas generation, together with an expectation that technological change would deliver cheaper renewables.

We accept that such arguments have some force, but we stress an important corollary. The new energy technologies that are needed to meet our climate goals reliably and affordably do not just emerge by themselves. It is an unfortunate reality that across most of the developed world, there has been a multi-decadal decline in share of GDP devoted to public sector energy research, development and demonstration. Nowhere has this decline been deeper than the UK, as Figure 4.1 shows.

This decline means that energy research development and deployment capacity and in a way that gives as much emphasis to the (generally more expensive) development and demonstration stages as to early stage, academic research.

Figure 4.1: Public expenditure on energy research, development and demonstration as a fraction of GDP[108]



Research into new energy technologies should be focused on driving their costs down and their scale up, and the government will need to take a much more active role in making sure this research takes place and that UK industry benefits from it.

108 Figure created using data from International Energy Agency RD&D statistics, available at http://www.iea.org/statistics/RDDonlinedataservice/

Recommendation: The UK's energy R&D capacity must be increased. This will require the government take a much more active role in making sure this research takes place and that UK industry benefits from it. Particular attention should be given to building and strengthening R&D institutions that have a focus on scale-up and translational research.

Priorities for energy research, development and demonstration

Decarbonising our electricity supply is a high priority, but we should not forget that most of our energy use is in the form of directly burned fossil fuels - 78 per cent in 2016.[109] This includes gas for domestic, commercial and industrial use, and liquid hydrocarbons for transport (an additional 3.5 per cent comes from directly burnt biofuels). We need to take a holistic view of our energy economy - including generation, infrastructure, house building, and automotives - and search out ways in which energy policy and industrial strategy can be aligned better in all these areas.

Many of these areas of energy consumption will need to be electrified, in conjunction with the introduction of a much smarter grid and better demand management. This will need more electricity generation capacity. In order to meet an 80 per cent CO2 reduction target, close to 100 per cent of electricity generation will need to be low carbon.

A 100 per cent low carbon electricity system will need to rely on some combination of renewables, nuclear, and gas with carbon capture and storage. The problem of the intermittency of renewables will need to be overcome with some combination of new energy storage technologies and better demand management.

Carbon capture and storage (CCS) may be particularly important for decarbonising energy-intensive industries such as cement and steel-making, that release carbon dioxide directly as part of the process in addition to the emissions associated with their energy use. In addition, carbon capture and storage will be a central underpinning of so-called negative emission technologies, which in principle can reduce atmospheric carbon dioxide levels. Lord Oxburgh's report emphasises that CCS technologies are ready to be implemented at scale, with safe storage of CO2 in offshore reservoirs in the North Sea, and estimates the cost of electricity produced to be competitive with other low carbon sources.[110] This would require substantial government intervention to create the necessary infrastructure and financial incentives.

Recommendation: Achieving a 100 per cent low carbon electricity system will require investment in new energy storage technologies and better demand management. Carbon capture and storage (CCS) offers significant potential and the government should commit to invest in the necessary infrastructures for CCS technologies to be fully utilised and provide financial incentives to make them viable.

109 Department for Business, Energy and Industrial Strategy (2017) *Energy Flow Chart 2016* https://www.gov.uk/government/statistics/energy-flow-chart-2016

110 Report of the Parliamentary Advisory Group on Carbon Capture and Storage (CCS) (2016) *Lowest Cost Decarbonisation for the UK: The Critical Role of CCS* http://www.ccsassociation.org/news-and-events/reports-and-publications/parliamentary-advisory-group-on-ccs-report/

The Nuclear New Build programme

Perhaps the most pressing problem is the need to replace existing nuclear generating capacity. The urgency arises because, of the existing fleet amounting to 8.9 GW capacity, all but 1.2 GW will need to be retired by 2030.

Since 2008, it has been the policy of the UK government, through successive administrations, to support a programme of nuclear new build, to be financed and operated by the private sector. Currently plans exist to build up to 16 GW of new nuclear capacity, including the 3.2 GW at Hinkley Point C, at a total capital cost of at least £60 billion. This programme is an ideal case study of the way energy policy and industrial policy have been connected in the past, and should be connected better in the future.

The stipulation that the nuclear new build programme should not receive direct government funding or subsidies has greatly reduced the government's degree of leverage over the programme. Yet the government remains financially exposed through loan guarantees, and through contract-for-difference agreements. It indirectly guarantees very long-term revenue flows through commitments to the price consumers and industry will pay for electricity.

Most of the developers and all the technology vendors involved are based overseas and although the projects will involve large contracts with UK suppliers, the scope for developing UK supply chains for the highest value elements is seriously weakened by this fact, and by the fact that the capital funding is sourced wholly from overseas organisations too, including some with substantial shareholdings by overseas governments. Further, the selection of different technologies by different owners for the different sites means that each will need to develop its own supply chain independently.

Recommendation: The government should consider taking a significant equity stake in future nuclear new build projects, and should develop the supply chains for the UK nuclear industry to ensure that UK business is able to supply a higher proportion of the highest value components of new nuclear build.

Green industrial strategy

One view is that green growth should be the dominant framing of industrial strategy, where green growth is defined, in the economist Dani Rodrik's words, as 'as a trajectory of economic development that is based on sustainable use of non-renewable resources and that fully internalizes environmental costs, including most critically those related to climate change'.[111]

This is an attractive vision, but there are pitfalls. Firstly, we need to be wary of any suggestion that there is any inevitability about the economy moving towards a more sustainable basis. It is, sadly, all too easy to foresee a future in which fossil fuel powered economic growth continues amidst an increasingly degraded environment. This is a matter of politics.

The pessimistic view is that politics will always favour short-term factors – in Rodrik's view 'we are unlikely to get purely green industrial policy, focusing directly on the development and diffusion of green technologies instead of competitiveness, commercial, employment, or fiscal motives'.[112] Roger Pielke puts the matter even more brutally in his 'Iron Law' - 'When policies focused on economic growth confront policies focused on emissions reduction, it is economic growth that will win out every time.'[113]

111 Rodrik, D. (2014) 'Green Industrial Policy', *Oxford Review of Economic Policy*, 30 (3), pp. 469–491

112 Ibid.

113 Pielke, R. (2011) *The Climate Fix: What Scientists and Politicians Won't Tell You About Global Warming*. New York: Basic Books.

The optimistic view is that this conflict can be resolved by the aggressive development of low carbon energy technologies able to compete on price with fossil fuels. But this will need government to set out a much clearer direction, presenting a positive vision of what a prosperous, sustainable low-carbon economy might look like, and setting priorities for the new technologies needed and implementing actions at a scale that will deliver them.

Wider resource issues

Decarbonisation of the energy economy is one part of a wider agenda of moving the economy to a more sustainable basis. Evidence shared with the Commission by The Schumacher Institute stressed the need for economies to a 'safe and just operating space', in which resource and environmental limits, and associated reduction targets identified.[114]

A key argument made by proponents of the need to promote more resource efficiency, particularly through the concept of the 'circular economy'[115], is that prices should reflect real costs, so that negative externalities are more effectively priced and perverse subsidies removed. This is a compelling argument. Currently in the UK there are a patchwork of measures that work in this direction, though without coherence and as yet without (to our current understanding) a fully worked out economic rationale. For example, we have a Landfill Tax, a Plastic Bag Charge, and perhaps most importantly the Waste Electrical and Electronic Equipment Directive.

The latter is important as it gives the manufacturers of electrical goods – many of which use a variety of rare and potentially scarce elements and minerals – some responsibility for their products through their whole lifespan to end-of-life. There is an interesting potential resonance here with our discussion of the way forward-thinking manufacturers seek to capture more of the value associated with their products through selling services associated with the product throughout its life.

Recommendation: The government should undertake a review of environmental taxation and regulation to assess how effectively these are properly pricing externalities and incentivising innovation around sustainability through the whole product life-cycle. We suggest this would be an appropriate commission for the government to give to the new Office for Strategic Economic Management that we propose.

114 The Schumacher Institute (2017) *Submission to Labour Party consultation on Industrial Strategy* http://www.schumacherinstitute.org.uk/submission-to-labour-party-consultation-on-industrial-strategy/

115 Ellen Macarthur Foundation (2015). *Towards a circular economy: Business rationale for an accelerated transition* https://www.ellenmacarthurfoundation.org/publications/towards-a-circular-economy-business-rationale-for-an-accelerated-transition

5. Health and social care at the centre of industrial strategy

In *Laying the Foundations*, we identified as a key strategic goal ensuring there is an effective, efficient and financially viable health and social care system, in the context of the demography of the UK. The population is ageing, increasing demand for health and social care services, particularly for much older people with a range of complex needs. By 2040, the number of people aged over 85 in the UK is expected to double to 3.4 million. Thinking about social care, public health, the NHS (as a market as well as a service), and the strong industrial sectors in pharma/life sciences and medical technology, as a whole system reveals powerful potential synergies. The mix of scale, expertise, supply and demand issues and major political/public policy challenges that characterize the UK's health and social care system makes it an obvious focus for industrial strategy.

We need to articulate a positive vision for the future of the health and social care system, which makes the most of the potential of new technology, while retaining a focus on people - both the people who use the services, and the professionals who provide it. For example, a recent NESTA study highlights the potential of digital technology, large-scale health data, and social innovation to create a system where people are more engaged in their own health, where precision medicine reduces unnecessary and ineffective interventions, and where economies of scale delivered by more specialisation and centralisation of routine procedures free up resource for new initiatives centred on patient needs.[116]

To achieve such positive change, our health and social care system needs to be more receptive to innovation – and the opportunities for businesses to prosper by contributing to that innovation are huge, given the scale of the health and social care system relative to the whole economy.

Health and social care as drivers of industrial strategy

Health and social care should take a central role in the industrial strategy. This role has multiple dimensions:

- The organisations that directly deliver health and social care – hospitals, primary care providers, long-term domiciliary care providers, and so on – collectively constitute a substantial proportion of the overall economy and employ a large number of people, so the productivity of their activities should be a focus for improvement.
- Health and social care services are provided in all places in the UK. Ensuring all people can access effective local services form a core part of the Universal Basic Infrastructure we call for.
- Technological innovations raise people's expectations of healthcare, but also have the potential to increase the productivity and effectiveness of the health and social care system. This in turn creates new markets for new products of those industries that supply the health and social care sector – pharmaceuticals, biotech and medical technology.

116 Bland, J., Khan, H., Loder, J., Symons, T. and Westlake, S. (2015) The NHS in 2030: a vision of a people-powered, knowledge-powered health system, *NESTA* http://www.nesta.org.uk/publications/nhs-2030-people-powered-and-knowledge-powered-health-system

- The industrial sectors that are suppliers to health and social care - pharmaceuticals, biotech and medical technology – are strong in the UK, and represent substantial value creation and export potential. The global market is expanding with global expenditure on health care predicted to be $8.7 trillion by 2020, an increase in from $7 trillion in 2015. This presents a considerable opportunity for innovative products and services developed by UK firms to be sold worldwide. The rising global spending is projected to be driven both by rising expenditure in emerging and lower-income countries and by the expansion of services in developed countries.[117]
- The research base in the UK in relevant areas – including classical biomedical science, the areas of emerging importance such as data science and machine learning, and the social science behind public health and health economics – is strong, and well-connected to industry and the healthcare system.
- Finally, the health and well-being of the population at large is closely connected to the wider economy. A sick workforce is not a productive workforce, and inequalities in health across the UK translate directly into lost productivity. The Marmot report estimated the economic cost of health inequalities in England at ~£31-33 billion a year in 2010.[118] Because health inequalities are strongly correlated with economic inequalities, this provides another mechanism by which regional disparities in economic performance are amplified.

The current situation is far from ideal. The fact that the state pays for much of the various health and social care services in the UK should offer the potential for using procurement to encourage innovation, but currently the potential of using the NHS as a customer to create new markets for health innovations is underutilised. Nor are we grasping the opportunity to transform the skills, productivity and prospects of employees in health and social care throughout the whole of the country, through the deployment of technology and the more productive organisation of the provision of the entire range of prevention, health and care services. With rising demand for services, particularly with regard to social care, which a civilised society would wish to meet, the challenge is to improve procurement, delivery and training to ensure that the cost does not dominate the public spending budget. This would impair the ability to invest in other aspects of the economy, or result in higher taxation which may have potential disincentive effects. It is also widely accepted that public health, NHS care and social care (both domiciliary and in care homes) need to be far better integrated. Organisational change, skills development and technological innovation need to go hand-in-hand to allow the potential gains to be captured.

The UK's current health and social care system therefore presents significant challenges, but meeting them also contains significant opportunities and the need for a strategic perspective is therefore pressing. For example, the potential benefits of the new technologies are tremendous but they also have inherent risks. The vast expansion of medical and personal data, from genomic information and health records to data harvested from wearable devices, or other socio-demographic databases raises many sensitive societal and ethical issues – as well as offering great promise for healthier lives. More negatively, in an ageing population, substantial increases in neurodegenerative diseases are likely. These diseases remain stubbornly resistant to the development of new effective therapies - a reflection of a more general problem of apparent diminishing returns in drug discovery.[119] Both the positive and the negative aspects need to be addressed. The development of technologies and their adoption are likely to involve new institutions and will inevitably involve partnerships between the public and private sectors.

117 Deloitte (2017) *2017 global health care sector outlook* https://www2.deloitte.com/global/en/pages/life-sciences-and-healthcare/articles/global-health-care-sector-outlook.html

118 Estimated productivity losses due to health inequality, measured against a counterfactual in which everyone has the same health outcomes as the richest English decile; The Marmot Review (2010).*Fair Society, Healthy Lives* http://www.parliament.uk/documents/fair-society-healthy-lives-full-report.pdf

119 Scannell, J. W., Blanckley, A., Boldon, H. and Warrington, B. (2012), 'Diagnosing the decline in pharmaceutical R&D efficiency' *Nature Reviews Drug Discovery* 11, 191-200.

Consideration must also be given to how industrial strategy for health and social care is framed. One way is to begin with the industrial sectors as conventionally defined. These include pharmaceuticals and biotechnology, and medical technology, as suppliers to the health and social care system.

The government has already commissioned an industrial strategy document in this area as part of its approach to finding 'Sector Deals'. The *Life Sciences Industrial Strategy*, led by Professor Sir John Bell, is largely framed as a sector strategy for the suppliers to the health and social care system, pharma, biotech and medical technology, though as its title indicates there is also a strong element of 'science push' from the UK's very strong academic base in biomedical research.[120]

These sectors are of significant importance to the UK economy, with much of their research and products being world-leading and so will be central to the new industrial strategy. However, we consider that there is also a need to take a different perspective, in which domestic strategy is primarily framed around the strategic goal of achieving a financially viable health and social care system, rather than focusing on the suppliers to the system. Focusing on the outcomes that we want to achieve encourages fresh thinking about how to realise them. This approach would elevate to a top priority solving the central problem that the UK's health and social care system is, as currently configured, not an easy environment for innovation to take place in.

Recommendation: Health and social care should be integral to the new industrial strategy. This should aim to use the state's purchasing power to promote innovation in a way that creates new value in the pharmaceutical, biotech and medical technology industries; raise the direct productivity of the health and social care sector, and ultimately achieve better health outcomes in a financially sustainable way.

The scale and productivity of health and social care

The OBR's latest prediction is that spending on health and social care will rise faster than GDP from 2020[121] and that health spending as a share of GDP could increase from 7.4 per cent now to 8.8 per cent in 2030.[122] This underlines how much the scale and productivity of the health and social care sector matters greatly to the economy as a whole.

In the UK health and social care spending in 2015 was £195 billion (£185 billion on health and £10 billion of social care). The ONS estimates that the health and social care sector contributes 10 per cent of GVA and employs 10 per cent of the workforce.[123] These sectors involve a mix of public and private funding and delivery. Around 80 per cent of health spending is publicly funded (£147 billion) and 20 per cent privately funded (out of pocket £27.4 billion and voluntary insurance £6.3 billion). Long-term care spending was £44 billion in 2015 of which £34 billion is included within health and the remaining £10 billion is social care.

120 Office for Life Sciences (2017) *Life Sciences: Industrial Strategy* https://www.gov.uk/government/publications/life-sciences-industrial-strategy

121 Office for Budget Responsibility (2017) *Fiscal sustainability report; January 2017* http://budgetresponsibility.org.uk/fsr/fiscal-sustainability-report-january-2017/

122 Licchetta, M. and Stelmach, M. (2016) 'Fiscal sustainability and public spending on health', *Office for Budget Responsibility Fiscal sustainability analytical paper* http://budgetresponsibility.org.uk/docs/dlm_uploads/Health-FSAP.pdf

123 ONS (2017) *UK Health Accounts: 2015* https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthcaresystem/bulletins/ukhealthaccounts/2015; ONS (2016) *Labour Market Statistics: February 2016* https://www.ons.gov.uk/releases/labourmarketstatisticsfebruary2016

The data above uses the new, comparable definition of health spending adopted by the OECD in 2011, and finally by the UK last year. Comparisons between countries are complicated by these definitional issues, but a recent analysis suggests that total UK public and private spending on health and social care as a proportion of GDP is actually greater than the EU-15 and OECD averages.[124]

In the UK most social care and health related long-term care – whether publicly or privately funded – is provided by independent or voluntary sector organisations. A large proportion of what the UK has in the past classified as social care is privately funded. Among those unable to fund care there is evidence of considerable unmet need, as the eligibility threshold for local authority funding has been shifted over recent years in response to the cutbacks in local authority budgets.

According to the IFS public sector adult social care spending in 2015/16 was £16.4 billion.[125] Whilst this paper is based on the older definition of health spending, it draws out that there has been a real terms fall of 6.4 per cent in publicly funded social care since 2009/10. As the IFS state:

> 'unlike health care, the majority of social care in England is either paid for privately or provided informally on a voluntary basis (e.g. by a partner or child). The largest source of care is relatives who provide informal care. Estimates from the National Audit Office (NAO) indicate that the replacement cost of all informal care could be as much as six times public spending on care.'[126]

For curative health care the public sector plays a larger role, but a proportion of public money is spent with non-NHS providers, mainly in the private sector. In England this amounts to 13 per cent of the NHS commissioning budget– a substantial increase over recent years (this spending rose in real terms by over 20 per cent between 2013/14 and 2015/16).[127] In addition, GPs, pharmacists, dentist and ophthalmologists provide services to NHS patients as independent contractors. The NHS also buys goods and services – most notably drugs and devices – from the private sector.

The increase in the share of GDP spent on health and social care that is projected by the OBR will take place despite some improving productivity: ONS figures show average growth in public service health care productivity (which is acknowledged to be very hard to measure) in the UK from 1995 to 2014 was 0.9 per cent per annum.[128] Longer productivity trends show that healthcare productivity rose by 1.2 per cent per year since 1979.[129] The Health Foundation's evidence submitted to the Commission suggested further scope for improvement, however,

124 Appleby, J and Gershlick B (2017) 'Keeping up with the Johanssons: How does UK health spending compare internationally?' *British Medical Journal*, 358 https://doi.org/10.1136/bmj.j3568

125 Institute of Fiscal Studies (2017) 'UK health and social care spending' *Green Budget 2017* https://www.ifs.org.uk/publications/8879

126 The National Audit Office paper cited by the IFS is *Adult Social Care in England: Overview, 2014* https://www.nao.org.uk/report/adult-social-care-england-overview-2/

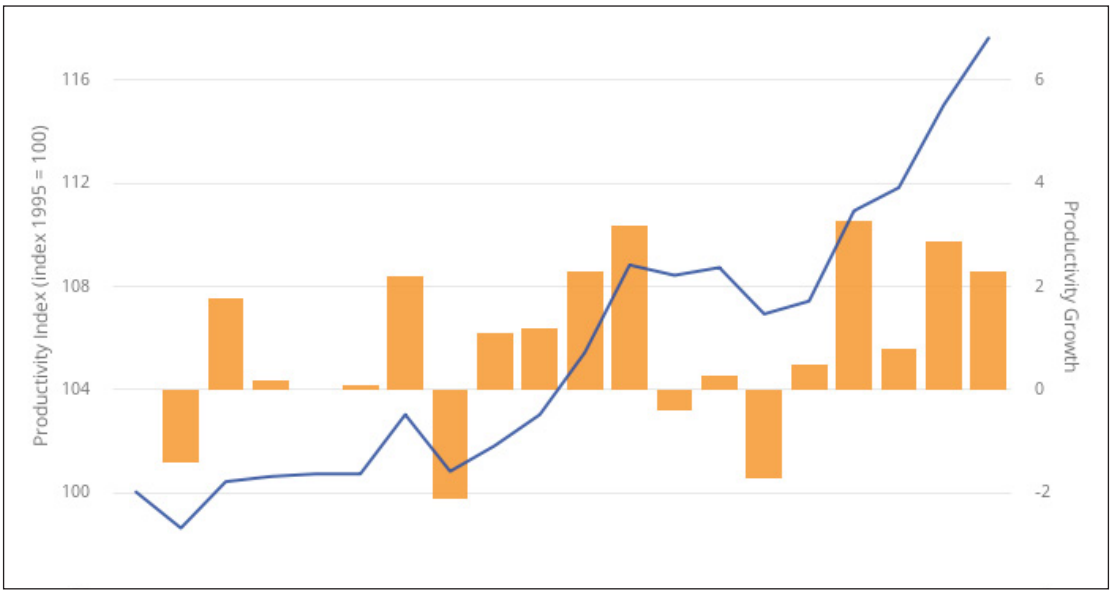
127 Lafond S., Charlesworth A., and Roberts A. (2017) 'A year of plenty?', *The Health Foundation* http://www.health.org.uk/publication/year-of-plenty

128 Licchetta, M. and Stelmach, M. (2016) 'Fiscal sustainability and public spending on health', *Office for Budget Responsibility Fiscal sustainability analytical paper* http://budgetresponsibility.org.uk/docs/dlm_uploads/Health-FSAP.pdf

129 Bojke, C., Castelli, A., Grašič, K., Howdon, D., Rodriguez Santana, I. and Street, A. (2017) 'Productivity of the English NHS: 2014/15 Update', *Centre for Health Economics (CHE) research paper 146* https://www.york.ac.uk/media/che/documents/papers/researchpapers/CHERP146_NHS_productivity_update2014_15.pdf

as there is quite wide variation between hospitals.[130] Lord Carter's review of operational productivity also highlighted large variations in the cost of inpatient care.[131] Adult social care productivity fell for seven consecutive years between 2007 and 2013. In 2014 the ONS reported a small increase of 0.5 per cent. In part this may reflect the problems measuring outputs for adult social care.

Figure 5.1: Public service health care productivity index and growth rate 1995 to 2014[132]



In their evidence to the Commission the Health Foundation stated:

> 'The productivity and efficiency of the health and care sectors matters for three reasons. First, no economy, however large and high performing elsewhere, can afford to have a sector that is one tenth of all economic activity which is not performing well, especially as this sector employs a significant proportion of the most talented and highly educated graduates from the education system. Second, in disadvantaged areas health and social care often account for a disproportionately large share of local economic activity. Finally, the long-term efficiency and productivity of the system will have an impact on the level of public spending required to sustain quality and access, and fiscal sustainability.'[133]

We agree with this assessment. The scale of the health and social care sector and its huge productivity footprint underline why a new industrial strategy must have the sector at its centre.

130 Evidence submitted to the Industrial Strategy Commission by The Health Foundation.

131 Carter, P. (2016) *Operational productivity and performance in English NHS acute hospitals: Unwarranted variations*https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/499229/Operational_productivity_A.pdf

132 ONS (2017) *Public Service productivity and estimates: healthcare, 2014* https://www.ons.gov.uk/economy/economicoutputandproductivity/publicservicesproductivity/articles/publicservicesproductivityestimateshealthcare/healthcare2014

133 The Health Foundation evidence submission.

Recommendations:
Future increases in public spending on health should come with the strict expectation that investment should be used to raise productivity. The provision of health and social care in all places means that even small productivity increases could have a significant impact.

The new independent Office for Strategic Economic Management should consider the delivery of publicly funded health and social care a key priority area for assessment.

Using the purchasing power of the health and social system to drive innovation and achieve better outcomes

NHS England currently spends around £9 billion on procurement (not including medicines[134]); of this about one third is spent on everyday goods and services, one third medical consumables, and one third high cost medical devices.[135] Given the extreme budget pressures that the NHS is under, it is not surprising that the emphasis in its procurement is on reducing this cost, rather than encouraging innovation. Institutional pressure inevitably prioritises making short-term cost savings over securing long-term sustainability through innovation.

Currently even the achievement of short-term savings is made difficult by the highly fragmented way in which the health system is organised - in the words of the Carter Report (2016) into operational productivity and performance there is '*a systematic failure to capitalise on the national nature of the NHS*.'[136]

This failure to operate nationally also militates against experimentation with more innovative services and products. Moreover, the barriers to the introduction of new technology are often institutional or organisational in character. One illustration of this is the boundary between health and social care – it is familiar that delayed transfers of care, where a patient is healthy enough to be moved from an acute bed, but where care is not available, currently cost an estimated £900 million a year for NHS England alone, and also causes major distress to patients and their families. Many technological solutions to make it easier and safer to live independently are being developed, but if the basic institutional structures that could permit this are not in place these cost-saving advances will remain unrealised.

Sir John Bell's life sciences report states that:

> 'Evidence demonstrates that access to and diffusion of products in the NHS is often slower than in some comparable countries. This environment risks creating a negative impression in boardrooms around the world with trials being diverted to geographies deemed more likely to use products. Partnership with industry through this strategy and a subsequent sector deal will be challenging unless there are clear signals that innovation will be encouraged and rewarded, and the challenge of adoption of new innovation at pace and scale is resolved.'[137]

134 The 2014-15 cost of medicines in England was £15.5 billion. This represents a rise on immediately previous years, though evidence from the Health Foundation presents a long-term fall in average medicine prices as compounds come off patent.

135 Carter, P. (2016) *Operational productivity and performance in English NHS acute hospitals: Unwarranted variations* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/499229/Operational_productivity_A.pdf

136 Ibid.

137 Office for Life Sciences (2017) *Life Sciences: Industrial Strategy* https://www.gov.uk/government/publications/life-sciences-industrial-strategy

We agree with this view and the Commission was given considerable evidence about the untapped potential for the NHS both to use and to foster innovations.

We support the aims of the NHS Test Beds programme which invites private sector companies to work in partnership with NHS and social care organisations to develop innovations that can be practically implemented in the health and social care system.[138] There is a recognition that technological innovation needs to be developed in the clinical context in which it is going to be used. However, for this programme and others to be successful there needs to be commitment from the participating health and social care organisations to reform their working practices to make the most of these innovations. There also needs to be stronger commitments to the participating companies that they will be able to find a large market in the NHS nationally for successful innovations that emerge from the programme.

SBRI Healthcare – the part of the Small Business Research Initiative led by NHS England in collaboration with the Academic Health Sciences Networks - has also produced very positive results through its programme of fully funded R&D contracts to innovative small companies to address healthcare problems.[139] Detailed follow-up performance data stresses the benefits brought to the NHS and its patients, to the businesses involved, and to the wider economy. The scale of the programme – currently about £13 million per year – should be expanded further, to the point at which the programme can make a material impact on the NHS as a whole.

We highlight two further examples to illustrate the potential for innovation in the health and social care system:

- **IT:** Following the difficulties of the National Programme for IT in the NHS, which was wound up in 2011, many healthcare trusts are purchasing and commissioning their own individual systems which often do not communicate with each other.[140] It is also often the case that GP systems are not interoperable with hospital systems. The recent successful malware attack (Wannacry) revealed how many hospitals had not installed recent anti-virus software because the operating systems on their computers are too old. A Nuffield Trust report in 2016 revealed that only 2 per cent of people in the UK report any digitally enabled transaction with the NHS.[141] This is when 88 per cent of UK adults use the internet and 71 per cent of UK adults own a smartphone. A better way to capture the huge potential benefits of ICT in our health and social care systems balance needs to be found; this needs to learn the lessons of the failed monolithic approaches of the past while better ensuring the interoperability and flexibility of systems.

138 Information about the NHS Test Beds programme is available at https://www.england.nhs.uk/ourwork/innovation/test-beds/

139 SBRI Healthcare (2017) *2016/17 SBRI Healthcare Annual Review* https://sbrihealthcare.co.uk/wp-content/uploads/2017/09/SBRI-H-Annual-Review-16-17-FINAL.pdf

140 For further information see: National Audit Office (2011) *The National Programme for IT in the NHS: an update on the delivery of detailed care records systems* https://www.nao.org.uk/wp-content/uploads/2011/05/1012888.pdf

141 Nuffield Trust (2016) *Delivering the Benefits of Digital Healthcare* https://www.nuffieldtrust.org.uk/research/delivering-the-benefits-of-digital-health-care

- **Social care**: In the case of social care, the potential for organisational and social innovations, and the development of technologies and care systems, to enable more people to live in their own homes for longer is considerable. Evidence from the Centre for Research on Socio-Cultural Change at the University of Manchester argued that 'social innovation in housing with care is about whether, how (and at what cost) it is possible to break with the dominance of the care home model of institutionalised group living'.[142] Different models of domestic care provision can be found in other European countries and in the US and should be studied in depth to learn more about their financial models and service provision. Local authority purchasers of care, as a result of extreme budgetary pressures, are increasingly forced to provide care for the lowest possible cost, which has implications for the quality of care and means the sector is a low wage, low skill employer with low investment in its staff and processes. Questions have also been raised about the financial viability of large private sector care home providers and the high returns their business models tend to demand.

Innovation should also be considered by health commissioners in terms of how services are provided. A number of places are now working on integration and building teams which break down silos across the health and social care divide. For example, Torbay moved towards integration early and established multi-disciplinary teams.[143] Joint working in this way can be more productive and improve the quality of care. It is much better for patients to have only one assessment of their condition and needs. Integration however is not a panacea, and indeed in February 2017 a National Audit Office report concluded that the early evidence was that progress towards integration, boosted by the Better Care Fund, has been slower and less successful than expected.[144]

Recommendation: There should be a rethink of procurement for both health and social care, with the aims of improving purchasing practice in the short-term to accelerate the adoption of new technologies and of looking for ways to stimulate innovation especially in domiciliary social care which will reduce the risk of spiralling costs as the population ages. Successful programmes for demand-led innovation, such as SBRI Healthcare, should be expanded and emulated.

Raising the standard of skills in the sector

However, what is clear is that health and social care offers great scope to develop new ways of delivering services and in particular to develop a higher value, higher productivity model. People receiving care at home are visited by a variety of people – cleaner, carer, district nurse, physiotherapist. More highly skilled people who can perform a wider variety of tasks, have more decision-making autonomy and more responsibility for outcomes could turn this into a sector with better paid and more satisfying work, higher productivity and better outcomes.

142 Burns, D., Cowie, L., Earle, J., Folkman, P., Froud, J., Hyde, P. Johal, S., Rees Jones, I., Killett, A. and Williams, K. (2016) 'Where does the money go? Financialised chains and the crisis in residential care', *CRESC public interest report* http://hummedia.manchester.ac.uk/institutes/cresc/research/WDTMG%20FINAL%20-01-3-2016.pdf

143 Thistlethwaite, P. (2011) Integrating Health and Social Care in Torbay, The King's Fund https://www.kingsfund.org.uk/sites/default/files/integrating-health-social-care-torbay-case-study-kings-fund-march-2011.pdf

144 National Audit Office (2017) *Health and social care integration* https://www.nao.org.uk/report/health-and-social-care-integration/

The implication of this is that a very different training route would be required. At the moment qualifications to enter social care are minimal, but what skills are needed to work at a higher level needs to be looked at. Co-designing any training with local further and higher education providers and with employers would be beneficial. Moreover, the provision of health and social care in all places means that the benefits of increasing the skills of people working in the sector would be felt across the country. While local variation should not be discouraged, there is also the need for a national set of standards for qualifications appropriate to an integrated system.

Recommendation: The new industrial strategy should aim to achieve higher productivity and better health outcomes by ensuring more skilled and satisfying jobs in the health and social care sector. An urgent focus on redesigning training and education should aim to both raise the skills of existing employees and attract new people to the sector.

Integration and place

The relationship of healthcare and geography is a complex one. Health and social care form part of a universal service offer in all places, however the institutional picture is complex. Health is devolved to the nations, so one has to be careful to distinguish the situation in England from that in Wales, Scotland and Northern Ireland. Within England, NHS England is itself comprised of a complex map of delivery and commissioning agents, including Acute Care Trusts and Clinical Commissioning Groups. Meanwhile social care and public health is the responsibility of local government – with Public Health England taking a coordinating and supporting role.

Perhaps the most significant geographical dimension arises from the very deep-seated inequalities in health outcomes across the UK. Data for England shows a regional gap in healthy life expectancy of 6.4 years for men and 6.6 years for women.[145] Health inequalities are closely correlated with inequalities in economic and other measures of deprivation. Mapping life expectancy against the Index of Multiple Deprivation of different small geographical areas (lower super output areas) by deciles shows a difference in healthy life expectancy of 18.7 years for men and 19.1 years for women between the most deprived and least deprived areas.

The health needs of different places clearly vary enormously. As such we consider there to be a strong case for integrated health and care strategies to be developed at a devolved level, albeit with co-ordination to enable innovation and the sharing of best practice. It is clear too that co-ordination across services – extending beyond the NHS and local authority care to involve other agencies such as Public Health England or voluntary organisations - is easier at this spatial scale rather than nationally. We would encourage experimentation and piloting, with rigorous evaluation. The experience of the Greater Manchester Combined Authority in the next few years will be illuminating. The devolved budget is £6 billion and without changes by 2022 there will be a £2 billion shortfall.[146]

In evidence to us, Ian Greer (Vice-President and Dean, Faculty of Biology, Medicine & Health at The University of Manchester) argued that a system wide approach was needed to unlock barriers between health innovation and industry, and how the organisational changes this would require might be easier to implement in sub-national geographical areas such as city-regions. He advocates a local rather than national system of data sharing. DataWell is a good example of this which links together all existing primary and secondary commissioning services across Greater Manchester, East Cheshire and East Lancashire.[147]

145 Public Health England (2017) *Health Profile for England 2017* https://www.gov.uk/government/publications/health-profile-for-england/chapter-5-inequality-in-health

146 A discussion of this can be found in Segar, J., Coleman, A. and Checkland, K.'s 2016 blog 'Health and social care devolution: it's complicated' for Policy@Manchester http://blog.policy.manchester.ac.uk/posts/2016/03/health-and-social-care-devolution-its-complicated/

147 For further information see: https://www.gmahsn.org/datawell

Meeting the needs of local populations in the decades ahead, integrating health and social care and taking advantage of the role of the NHS to innovate and develop high-value medical services and products– all make this both a big challenge and a big opportunity, and in a tight funding environment. Sustainability and Transformation plans, introduced as part of the NHS Five Year Forward View, aim to deliver £22 billion of savings by 2020, equivalent to 20 per cent of spend over 5 years.[148] A recent King's Fund report notes 'cuts in social care and public health and a lack of earmarked funds to support transformation will affect the ability of NHS organisations and their partners to implement their plans.'[149]

Recommendation: Health and social care services should be integrated, but this should be steered by the goal of achieving better outcomes for people's wellbeing and not purely by reducing costs. This will lead to savings but not on a sufficient scale to meet the spending pressures of an ageing population. Lessons must be learned from the places which are now experimenting with health and social care integration to build the evidence base for how to achieve better outcomes.

148 Coleman, A. (2016) 'Secrecy and service challenges in the new NHS – can STPs deliver?', *Policy@Manchester blog* http://blog.policy.manchester.ac.uk/posts/2016/12/secrecy-and-service-challenges-in-the-new-nhs-can-stps-deliver/

149 Quote taken from P2: Ham, C. Alderwick, H., Dunn, P. and McKenna H. (2017) 'Delivering sustainability and transformation plans: from ambitious proposals to credible plans', *The King's Fund* https://www.kingsfund.org.uk/sites/default/files/field/field_publication_file/STPs_proposals_to_plans_Kings_Fund_Feb_2017_0.pdf

6. Unlocking long-term investment

Under-investment is one of the hallmarks of the UK's economic malaise. The UK has one of the world's largest finance sectors, yet a relatively poor record on investment. *Laying the Foundations* noted a particular weakness around business investment[150], but the problem is also a general one. The UK's investment rate (both public and private) as a proportion of GDP is around 5 percentage points below the OECD average – and this gap is widening. While most Western economies have also experienced a decline in investment in the past few decades, as part of the process of deindustrialisation, the UK's investment rate has fallen further than most.[151]

Under-investment is not a simple problem to address, or even define, since investment comes in many forms. While it is not the job of an industrial strategy to determine how and where private enterprises should invest, ensuring that there is a plentiful and appropriate supply of capital to the most (potentially) productive economic activities is a legitimate aspect of the strategic management of the national economy.

As stated in Chapter One, it is now firmly recognised that the UK's capital allocation mechanisms are failing to supply sufficient or appropriate capital needed to maximise opportunities for industrial development. Of course, a lack of *demand* for finance is the context in which this failure occurs, which again underlines the need for a more strategic approach to economic management. This approach is needed to create a greater array of opportunities for long-term investment, particularly riskier investments which are likely to have the greatest impact on productivity. But this does not mean supply-side issues should be overlooked, and this report has already discussed several priorities in this regards, including new mechanisms for infrastructure and R&D finance.

Furthermore, there is an overlap between supply-side and demand-side factors. *Uncertainty* has often been the most important reason for reticence among potential investors in the UK economy. Current uncertainty surrounding post-Brexit trading arrangements, on top of a sluggish recovery from the 2009 recession, further fuels this vicious circle in which holding back investment adds to the volatile economic conditions which provide for uncertainty.

By adopting a long-term vision for industrial strategy, with the required resources and institutional mechanisms, and committing to invest in areas where the state is best-placed to lead, public authorities can help to create to nurture investable opportunities, while at the same mitigating the barrier of uncertainty which constrains private investors.

The public sector

As stated in our first report, we believe that a successful industrial strategy will require a high level of capital investment by the public sector, maintained over the very long-term. This is partly to overcome the hurdle of uncertainty, but also because, in some areas such as major infrastructure projects, public services and the early stages of high-risk technological innovations, the state is the most appropriate and efficient investor in terms of its ability to bear risks and invest for the sake of future generations. In general, public sector investment 'crowds in' private investment by boosting demand throughout the economy – this is particularly applicable to the UK's economic circumstances.

150 Analysis of Gross Fixed Capital Formation data from the World Bank (available at http://data.worldbank.org/indicator/NE.GDI.FTOT.ZS) and OECD data on investment by sector (available at https://data.oecd.org/gdp/investment-by-sector.htm) shows that Italy had the lowest share of business investment across the G7 in 2015 at 8.9% of GDP followed by the UK at 9.4% of GDP.

151 See Gross fixed capital formation data at https://data.worldbank.org/indicator/NE.GDI.FTOT.ZS?end=2016&start=1970&view=chart.

Ultimately, however, the aggregate level of public investment matters less than the types of investment undertaken by the public sector, the places it invests in and the local and national institutions through which investment is undertaken. As such, public investment needs to be undertaken more strategically, not least to maximise crowding-in effects. Public investment in line with clear and durable industrial strategy goals will also help to minimise uncertainty arising from the inconsistencies in levels of government commitment across electoral cycles.

Recommendation: To support industrial strategy objectives, the government should recognise that public investment is indispensable – part of the solution to the UK's economic predicament, not part of the problem. The government should therefore, firstly, adopt criteria for public investment which better recognise its crowding-in effects. Infrastructure, public services and early-stage technological development are clear priorities in this regard.

The current lack of clear and durable industrial strategy goals for public investment contributes to the relatively incoherent manner in which public investment is currently undertaken. Recent years have seen the creation of several, often overlapping, pots of public expenditure in this area, such as the British Business Bank, the Local Growth Fund, the Northern Powerhouse Investment Fund, and more recently the Industrial Strategy Challenge Fund. Other funds such as the Regional Growth Fund have come and gone (2010-16). The Treasury recently proposed the creation of a National Investment Fund for small firms as part of its current Patient Capital Review (see below).

How these funds work alongside each other, if at all, is not entirely clear. Some focus on innovation and/or small firms in a place-blind manner, and some focus on supporting disadvantaged regions, with relatively thin objectives around boosting local productivity. The Green Investment Bank, established by the coalition government, focused on a particular strategic objective – but has now been privatised. Greater coherence and stability within public investment, where the relationship between the centre and localities is clear, and a robust set of institutions can trade-off priorities as they pursue strategic goals, is essential.

The most important priority, if a new industrial strategy is to succeed, is for levels of public investment to be sustained. Local authority budget cuts are undermining some resources available for business support. All local economies are facing the prospect of losing European Union structural and investment funds, with some set to lose considerable sums.[152] This is not to say that the government should adopt a like-for-like replacement for these funds, since EU investment criteria related to 'cohesion' may be less relevant when the first priority for public investment in the coming years in many areas will relate to adapting to a post-Brexit environment (we note that the government's proposed replacement, the Shared Prosperity Fund, promises another fund with a slightly different remit to those funds already in operation). However, it is important that there is no overall fall in public investment following EU withdrawal, irrespective of any EU-UK deal on budget contributions.

Recommendation: Commitment to public investment should go hand-in-hand with new local and national institutional mechanisms for investment, bringing greater coherence and stability to investment funds currently available, and ensuring they are aligned with the overall industrial strategy objectives.

152 Hunt, T., Lavery, S., Vittery, W. and Berry, C. (2016) UK regions and European structural and investment funds, *SPERI British Political Economy Brief No. 24* http://speri.dept.shef.ac.uk/wp-content/uploads/2016/05/Brief24-UK-regions-and-European-structural-and-investment-funds.pdf

Patient capital and private investment

Patient Capital Review

The government has recently consulted on the paper *Financing Growth in Innovative Firms*, issued as part of its Patient Capital Review which is being led by HM Treasury.[153] The paper outlines the government's view, very much shared by us, that the volume of capital available for scaling up early-stage innovation in the private sector is insufficient. It notes the existence of a 'negative feedback loop' whereby low demand for investment in innovation creates a 'thin' market where returns are low (or there is a significant risk that they will be low), exacerbating the problem, and creating other problems such an under-developed market, so that firms find it difficult to attract talent and build expertise as they seek to grow.

Unfortunately the government's approach to the Patient Capital Review is proceeding without due attention to industrial strategy, specifically the government's role in nurturing scalable projects. In fact, *Financing Growth in Innovative Firms* appears to disavow public investment in this regard by offering the 'working assumption' that public investment risks crowding out private investment. We do not endorse this assumption. It should also be noted that some capital is not *impatient* enough: the concentration of bank finance, for instance, in smaller, risk-averse firms is a factor contributing to the UK's high proportion of unproductive small and medium-sized enterprises (SMEs), and one of the reasons for the thin market for innovation finance that the paper notes.

Our first report noted that venture capital into early-stage and technologically innovative firms looking to grow is relatively limited, and heavily dependent on government finance, including EU funds – a problem related to both demand and supply. Venture capital investments are also weighted towards London and the South East, with other regions more likely to be dependent on public money. To reiterate the argument from above: we would not suggest that such public support should be withdrawn. Rather that it should be delivered more coherently, through robust local and national institutions. Chapter Three discussed at length the reforms we believe are necessary to both local government and agencies involved in R&D – public support for venture capital should be operated as appropriate through these frameworks.

In Chapter Three we noted that the government could play an important role as a lead customer of R&D intensive companies, as well as an investor. David Connell stressed to the Commission the importance of R&D contracts as an alternative form of support to technology intensive companies to equity finance:

> 'By providing non-dilutive finance at a stage in a company's development where equity investment is unavailable or expensive, lead customer innovation contracts like SBRI also make it easier for founders to retain control and build a substantial business rather than being forced to sell out early to a larger, and typically foreign based, corporation. This is the secret of the majority of the most successful new STEM based businesses to have been created in the UK in recent decades.'[154]

The government's main attempts to nurture private venture capital take the form of tax reliefs, at a cost to the taxpayer in revenue foregone (around £920 million in 2014/15) which exceeds several-fold direct government investment in venture capital, and is indeed is much higher than the total budget for Innovate UK (around £550 million per year).[155] While direct government

153 HM Treasury (2017) *Financing Growth in Innovative Firms: A Consultation* https://www.gov.uk/government/consultations/financing-growth-in-innovative-firms

154 Evidence given to the Commission by David Connell.

155 The three relevant schemes are the Enterprise Investment Scheme (EIS), the Seed Enterprise Investment Scheme (SEIS) and the Venture Capital Trust (VCT). These supported more than £2 billion of investment in 2014/15. The cost to the public sector of these schemes – In foregone tax revenue – is estimated as 36 per cent of investment for EIS, 44 per cent for VCT, and 56 per cent for SEIS.

investment in venture capital is skewed to the poorer regions, more than half of the funds of the relevant tax relief schemes go to London (75 per cent in total is invested in London, the South East and East Anglia) while, in contrast, Yorkshire and Wales receive only 1.1 per cent, and the North East receives less than 1 per cent. Interestingly, *Financing Growth in Innovative Firms* cites an academic study which argues strongly against the use of up-front tax incentives for venture capital investments.[156]

To enhance private finance for venture capital, business support bodies (discussed elsewhere in the report) can help to regularise interactions between investors and investees – overcoming market 'thinness'. It would also be useful to review whether public policy and regulatory changes are required to encourage institutional investors such as pension funds to allocate greater funds to venture capital (the government has been active in this area in relation to infrastructure investment by some pension funds – albeit with limited success – recommending, for instance, pooled funds among local authority pension schemes).[157]

The consultation paper notes that there are barriers to long-term venture capital investment for institutional investors in this regard, and acknowledges these barriers are reinforced by the shift from defined benefit to defined contribution in pensions saving, but suggests only 'industry-led attitudinal change' as the solution. We believe further consideration is required regarding the regulation and industrial structure of defined contribution pension schemes, if the potential to align a new generation of savers with industrial strategy goals around venture capital and infrastructure investment are to be realised.

Recommendation: We await the outcome of the Patient Capital Review but we strongly encourage HM Treasury to ensure that its recommendations are aligned with overall industrial strategy objectives. In particular, we welcome the apparent commitment not to extend tax reliefs to venture capital, but would urge the government to go further by reforming these reliefs so that they support riskier, early-stage innovations throughout the whole of the UK – and indeed to redirect the relevant budgets towards direct investment. We would also encourage greater consideration of the relationship between pensions provision, regulation and long-term investment.

Bank finance

The extent to which the UK should be looking to its banking sector to finance innovation remains unclear. Around one in five SMEs has a bank loan, and in 2016 the Competition and Markets Authority described the pricing of SME loans as 'complex' and 'opaque'.[158] We know that SMEs based outside London are more likely to be denied credit and that, overall, lending to small firms (fewer than 50 employees) has been negative in all but one quarter in the five years up to the first quarter of 2017).[159]

However, a failure by banks to lend does not necessarily equate to a failure to invest in innovation – since it may be the least innovative firms which are being denied credit, and that the lack of

156 Lerner, J. (2012) *Boulevard of Broken Dreams: Why Public Efforts to Boost Entrepreneurship and Venture Capital Have Failed – And What to Do About It*. Princeton: Princeton University Press.

157 Nightingale, P et al. (2009) *From Funding Gaps to Thin Markets: UK Government Support for Early-Stage Venture Capital* http://www.nesta.org.uk/publications/funding-gaps-thin-markets

158 Competition and Markets Authority (2016) *Retail Banking Market Investigation: Final Report* https://assets.publishing.service.gov.uk/media/57ac9667e5274a0f6c00007a/retail-banking-market-investigation-full-final-report.pdf

159 Cox, E. and Schmuecker, K. (2013) *Beyond Big Banks and Big Government: Strategies for Local Authorities to Promote Investment*, Northern Economic Futures Commission http://www.ippr.org/files/images/media/files/publication/2013/12/Beyond-Banks-Big-Govt_MAR2013_10545.pdf?noredirect=1; Stirling, A. and King, L. (2017) *Financing Investment: Reforming Finance Markets for the Long Term*, IPPR Commission on Economic Justice https://www.ippr.org/files/2017-07/cej-finance-and-investment-discussion-paper-a4-report-17-07-21.pdf.

innovative firms explains net negative lending to small firms at the aggregate level. And yet we also reiterate our earlier point that some capital is not impatient enough: the willingness of banks to lend to low-productivity businesses requires further analysis. Both points suggest that banks need to do more to better understand the business models and growth plans of their existing and potential customers.

One option to encourage investment in innovation worth exploring further is enabling intellectual property to be used as collateral by SMEs seeking bank finance (as in Malaysia, Brazil and Singapore).[160] This may increase access to credit for the most innovative firms with limited physical assets and where investment in new and untested products and services is riskier.

Our first report also raised the prospect of the new industrial strategy involving public investment banks – new finance mechanisms which could have an explicit focus on financing innovation, or building new industrial expertise in particular local economies. Most similar countries to the UK, and most emerging economies, have such institutions in some form, although there remains a lack of evidence on whether this experience would translate successfully to the UK, especially given the probable need for direct (rather than third-party) distribution.

However, we believe that a role for public banks is worth exploring where particular industrial or local needs can be demonstrated, and where they can clearly play an institutional role as well as a financing role in thickening capital markets and crowding in private investment. The British Business Bank has performed a limited version of this role since 2014, replacing various loan guarantee schemes as well as managing funds for direct investment, although a public bank would typically create credit rather than simply support private banks. The British Business Bank may move in this direction if the UK loses access to the European Investment Bank after Brexit.

At the national level, as discussed in Chapter Three, the case for a public bank focused on infrastructure is a strong one. This could, like the British Business Bank, simply amalgamate and enhance existing investment funds and loan guarantees (such as those administered by Infrastructure UK) or be set up as a more conventional bank, albeit publicly owned.

Recommendation: The government should commission new research, and pilot studies, into the possibility of a) extending private bank finance for innovation, through schemes such as intellectual property-backed lending, and b) expanding the role of public investment banks (albeit independent of any direct government control) especially where particular industrial and/or place-based needs can be demonstrated which align with strategic economic objectives.

Business investment

As noted above, the UK has a relatively low rate of business investment compared to other leading economies, which is especially concerning given the reliance of R&D investment in the corporate sector on internal cash flows. A range of explanations for low investment have been offered, with each likely to be correct to some degree for different firms. The predominance of services industries in the top ranks of the FTSE100 may be a key part of the explanation; companies in industries such as retail tend to be less capital-intense, and therefore have less need to recycle their profits into investment. We can also see profit retention as a rational response to the 2008 financial crisis as – amid uncertainty – firms sought to both reduce their dependence on bank finance and became slightly more risk averse. There is no reason to

160 Brassell, M. and King, K. (2013) *Banking on IP? The Role of Intellectual Property and Intangible Assets in Facilitating Business Finance: Final Report*, Intellectual Property Office https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/312008/ipresearch-bankingip.pdf.

assume that most businesses will continue to under-invest indefinitely, but, on the other hand, it will take a sizeable shift in extant practice to dent the UK's overall and long-term under-investment problem.

Many observers identify prevailing models of corporate governance in the UK as a key reason for under-investment. We had a small number of submissions which made such arguments; it has also become a recurring theme within the wider academic and policy literature on investment issues. Perhaps the main contention of this perspective is that a model of corporate governance which privileges shareholders is less likely to prioritise value-creation[161] Projects tend have higher hurdle rates where forgoing current income for shareholders is necessary (although shareholder primacy is the dominant model in the United States as well as the UK – yet the American economy is seemingly more adept than the UK at allocating capital to high-risk innovation).[162]

Quarterly earnings reports, designed for equity market investors and seen as a driver of short-termist practice, are no longer legally required in the UK, but remain widespread. We believe the government should implement the necessary regulatory change required to prohibit reporting in this form (the Investment Association, the asset management industry trade body, recently called for firms to stop reporting quarterly to focus on longer-term metrics[163]).

Research by Simon Deakin, Director of the Centre for Business Research at the University of Cambridge, suggests that the recent empowerment of shareholders – through, for instance, the 2006 Companies Act – has had a detrimental impact on long-term value-creation[164] (particularly in manufacturing industries[165]). Some contributors to the work of the Commission bemoaned the absence of German-style *Mittelstand* firms, which appear to combine innovation and flexibility with long-term continuity.

Moreover, a more sophisticated understanding of the innovation process (as offered throughout this report) encourages us to question the extent to which shareholders – rather than other stakeholders such as employees – bear the risks inherent in cumulative, organisational learning processes.[166] One of the solutions to this would be to adopt stronger measures for employee engagement in company decision-making. The government's recent review of corporate governance reform made some suggestions in this area – such as, for instance, employee advisory councils which would report to company boards – but they would not apply to all firms, and would in all likelihood not be mandatory.[167] In general, the review missed the opportunity

161 Belloc, F. (2012) 'Law, finance and innovation: the dark side of shareholder protection', *Cambridge Journal of Economics* 37(4), pp 863-888.

162 Driver, C. and Shepherd, D. (2005) 'Capacity utilisation and corporate restructuring': a comparative study of the US, UK and other EU countries', *Cambridge Journal of Economics* 29(1), pp 119-40.

163 See Quinn, J. (2016) 'UK blue-chip firms told to stop reporting every quarter' *The Telegraph* http://www.telegraph.co.uk/business/2016/03/20/uk-blue-chip-firms-told-to-stop-reporting-every-quarter/

164 Deakin, S. (2014) 'Against shareholder empowerment' in Williamson, J. et al. (eds) *Beyond Shareholder Value: The Reasons and Choices for Corporate Governance Reform*, New Policy Institute http://www.npi.org.uk/files/3814/0482/3043/Beyond_Shareholder_Value_FINAL.pdf

165 Deakin, S. (2013) *The Legal Framework Governing Business Firms and Its Implications for Manufacturing Scale and Performance: the UK Experience in International Perspective*, Centre for Business Research Working Paper No.449 https://www.cbr.cam.ac.uk/fileadmin/user_upload/centre-for-business-research/downloads/working-papers/wp449.pdf

166 Driver and Shepherd (2005) 'Capacity utilisation…'; Lazonick, W. (2014) 'Innovative enterprise and shareholder value', *Law and Financial Markets Review* 8(1), pp 52-64.

167 Department for Business, Energy and Industrial Strategy (2017) *Corporate Governance Reform: The Government Response to the Green Paper Consultation* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/640631/corporate-governance-reform-government-response.pdf

to better link corporate governance to industrial strategy. Company regulation should be geared primarily towards supporting industrial strategy by, for instance, incentivising long-term investment in productive capacity, including workforce development.

Recommendation: The government's proposals around corporate governance should be revised in line with industrial strategy objectives, and evidence on the relationships between company forms and long-term value-creation. The UK's corporate governance regime does not prioritise long-term investment over short-term income. There is no consensus on how best to achieve this but we suggest solutions will include greater employee engagement, collaborative and cumulative learning within firms, and prohibiting quarterly financial reporting.

7. Supporting high-value industries and building export capacity

As described in Chapter One, the UK has a relatively small number of high-productivity firms, measured in terms of gross value added (GVA) per worker. The UK has many more low-productivity firms than similar economies; this distribution means that that modal productivity among UK companies is 50 per cent lower than average productivity. Moreover, the productivity of the frontier firms, in the top 5 per cent, has pulled away from the laggards in the last 15 years.[168]

Part of the explanation for the poor productivity performance of UK firms is the relatively small size of high-value industries in the UK. There are very few areas of high-tech manufacturing, for instance, in which output has grown strongly in recent years.[169] As we discussed above, however, we are not advocating the idea of 'picking winners' that any discussion of focusing industrial strategy on particular industries tends to invoke. We also set out above the fundamental difficulties of defining sectors in an environment of rapid technological change, which will enable new entrants and could significantly reshape value chains. This is why we do not think sector deals are the right approach for the new strategy.

However, we also reject the simplistic distinction between 'horizontal' and 'sectoral' industrial policy. Some challenges clearly transcend industrial categories – such as decarbonisation and responding to population ageing – but will require the development and growth of certain high-value industries if they are to be met and the opportunities they present fully capitalised upon. An industrial strategy cannot be focused simply on supporting firms, but rather on creating an environment in which the most productive firms can thrive. Indeed, one of the dangers of a purely horizontal focus on the business environment is that it functions as sectoral support by default, benefiting incumbents rather than allowing challenger firms to emerge and the new industries which will shape the future economy to grow.

Accordingly, while the need to support high-value industries – and how to do it – is a core focus of this report throughout, this chapter discusses key areas of industrial policy traditionally considered to be horizontal in nature: increasing export capacity, strengthening competition policy and enhancing business support.

Export capacity

The UK's trade performance has been weak for a long time. The nature of our future trading environment is, in the wake of Brexit and a wider turn towards protectionist language across the world, uncertain. At worst, a less open trading environment would disrupt the position UK businesses have built in global supply chains, and lead to a significant weakening of areas of current UK comparative advantage, especially in high-value services. At best, new opportunities for trade may emerge, which could partially compensate for disrupted trading relations with the UK's main trading partners. But the UK will only mitigate the risks of the uncertain trade regime, and benefit from any new opportunities, if its exporters can produce more goods and services the rest of the world wants to buy than has been the case up to now.

168 Haldane, A. (2017) 'Productivity puzzles', speech delivered on 20 March at the London School of Economics http://www.bankofengland.co.uk/publications/Documents/speeches/2017/speech968.pdf

169 Berry, C. (2016) UK Manufacturing Decline Since the Crisis in Historical Perspective, *SPERI British Political Economy Brief No.25* http://speri.dept.shef.ac.uk/wp-content/uploads/2016/10/Brief-25-UK-manufacturing-decline-since-the-crisis.pdf

As such, whatever the prospects for the trading environment, the new strategic economic framework needs to develop the UK's capacity to export. The CBI argues convincingly that there remains a significant cohort of firms which have the potential to export, but lack the support necessary to do so.[170] We believe government support to business to help them realise this potential must form part of a new industrial strategy. The British Chambers of Commerce adds that:

> 'the UK needs a long-term and constant trade support model to ensure awareness and confidence amongst businesses. Over the years, it has become custom for all governments to chop and change the UK's trade support to businesses on a regular basis – which results in confusion for the business community due to lack of clarity. Businesses want face to face, on the ground trade advice and support, rather than an overreliance on digital platforms. Alongside local knowledge, businesses require expertise overseas in areas of export, facilitated by embassies, consulates and high commissions. Businesses also want greater resources for overseas trade missions and attending overseas trade exhibitions.'[171]

We share this perspective. However, we should not think about increasing export capacity solely in terms of supporting firms, but also disciplining them. *Laying the Foundations* emphasized the value of competition as a spur to the adoption of new technology and better management practices (this is discussed further below); exporting firms tend to have higher productivity as a result of the discipline of having to be competitive internationally. There is also currently significant technological change, with little certainty regarding which technologies will deliver commercial success and higher productivity. The more UK firms are engaged in global markets and in international value chains, the better placed they will be to adopt the most viable strategies in this regard.

Recommendation: The new industrial strategy should seek to significantly increase the UK's export capacity. It should strengthen existing mechanisms for export, focusing on incentivising challenger firms in high-value industries, rather than simply supporting incumbents. Improving productivity also requires that UK firms are both disciplined by overseas competition, and able to fully participate in international supply chains through which technological progress is disseminated.

Competition policy

The strength of competition in an economy and productivity are positively correlated.[172] Industrial strategy must therefore be concerned with ensuring a strong competition policy regime domestically and internationally, particularly to support excellence in high-value industries where the UK has a (potential) comparative advantage. Recent evidence from the US is suggestive of a link between growing concentration in business – undermining competition – and a productivity slowdown[173], and the British experience suggests that the adoption of policies to end protectionism and strengthen competition from the 1980s onwards subsequently improved productivity performance.[174]

170 CBI (2017) 'A Modern Industrial Strategy: UK 2030', *CBI response to the Government's green paper on industrial strategy* http://www.cbi.org.uk/cbi-prod/assets/File/CBI%20Modern%20Industrial%20Strategy%20submission(1).pdf

171 Quote taken from the British Chambers of Commerce evidence submission to BEIS' Green Paper (2017)

172 Ahn, S. (2002) 'Competition, Innovation and Productivity Growth: A Review of Theory and Evidence', *OECD Economics Department Working Papers, No. 317* http://www.oecd-ilibrary.org/economics/competition-innovation-and-productivity-growth_182144868160

173 Council of Economic Advisers (2016) *Economic Report to the President* https://www.gpo.gov/fdsys/pkg/ERP-2016/content-detail.html

174 Crafts, N. (2012). 'Creating Competitive Advantage: Policy Lessons from History', *University of Warwick working paper, No. 91* http://wrap.warwick.ac.uk/57857 Crafts, N. (2011) 'British Relative Economic Decline Revisited', *CEPR discussion paper No. 8384* https://ideas.repec.org/p/cpr/ceprdp/8384.html

Competition policy serves another purpose. As noted above, it is still some people's instinctive reaction that an industrial strategy will focus on 'picking winners', or in other words fall victim to lobbying, regulatory capture and political short-termism – and ultimately end up 'picking losers'. Whilst concerns about these phenomena have characterised UK economy policymaking for decades – despite the absence of a meaningful industrial strategy, the risk of 'government failure' is of course real. The key lesson is for an industrial strategy to be accompanied by a robust competition policy. Both are essential, but the UK is currently found wanting in both regards. As Sir John Kingman has recently said:

> 'The fight for the cause of competition, like the fight for free trade, is always a struggle. There is a constant tension between the interests of millions of consumers, highly dispersed and generally passive and disengaged, against the interests of well-resourced incumbent vested interests. … I am afraid there remains plenty to do.'[175]

Ensuring that innovators do not face prohibitive barriers to entry or expansion, and preventing incumbents from exploiting policies to enhance their own market position, will help avoid any risk of a new industrial strategy being structured to solely benefit incumbents. The UK will need to implement its own state aid policy outside the EU, through the Competition and Markets Authority (CMA). Any proposals for support to individual sectors – which are always defined in terms of incumbents – should be strictly time-limited through the use of sunset clauses. It is extremely hard for politicians to resist calls to assist struggling major industries or firms – witness the present government's need to respond to the crisis at Tata's UK steel operations. A robust institutional and policy framework is essential to help ensure financial assistance, which might be absolutely appropriate, is transitional, and that high productivity firms can expand, and low productivity firms shrink.

Competition policy also clearly needs to become more strategic, in the context of both a long-term strategic economic framework and significant technological innovation. Merger control, for instance, has over time become technical and incremental. The decision-making process needs to incorporate space to consider significant markets in a more strategic way. A good example would be the decision-making processes in telecoms markets in recent years, which have been split between Ofcom and the CMA, and have assessed individual mergers without consideration of the longer-term evolution of the market.

However, although a longer-term horizon in key markets is desirable, it would be a highly retrograde step to reintroduce any criteria other than competition into competition policy. The inclusion of financial services on the list of public interest areas where ministers can intervene is therefore regrettable. Outside national security and media plurality - areas where non-economic efficiency considerations must sometimes take precedence - competition policy is the wrong tool for addressing other, unrelated, public interest aims.

In addition to merger control and market inquiries, regulation has important competition consequences, and (as noted in Chapter Three) the UK regulatory landscape is unsatisfactory. The regulation of the natural monopoly utilities is vulnerable to frequent political interventions. The sector regulators governing them are vulnerable to regulatory capture. Some of the sectors governed by these regulators have among the most dismal productivity records in the economy.[176] With two exceptions, these sector-focused bodies (including telecoms and broadband) should be replaced with a horizontal regulator - especially as the market and technological landscape is changing in many of these sectors. The exceptions are media and

175 Kingman, J. (2016) 'The Treasury and the supply side', speech delivered on 20 October, https://www.scribd.com/document/328294000/Kingman-Speech

176 See Giles, C. and Tetlow, G. (2017) 'Bankers join list of five sectors dragging on productivity' *Financial Times* https://www.ft.com/content/a0cbe742-13a4-11e7-b0c1-37e417ee6c76 The article assesses ONS labour productivity data and reports that banking, telecoms, energy producers and management consultant sectors have had poor productivity performance since the financial crisis.

financial services, where questions of plurality on the one hand and financial stability aims on the other pose different challenges.

A further consideration is consumer policy, which has no strategic home within government. There are issues requiring serious thought across the board such as data security and privacy questions. Consumer policy should be restored as a function of the CMA, along with regulatory questions. This would enable joined-up long-term thinking about the consequences of regulatory reforms to help markets work better, and prevent industry concentration undermining competition and constraining productivity growth. It would also enable a focus on what accompanying policies might compensate the losers from regulatory reform. Competition and consumer protection can go hand-in-hand, to the benefit of both.

Recommendations: Competition policy must form a central part of a new industrial strategy and seek to support excellence in high-value industries where the UK has a (potential) comparative advantage. Competition policy needs to be considered with a more strategic long-term approach bringing together competition, merger, regulatory and consumer policies under the strategic direction of the Competition and Markets Authority (CMA). A priority Brexit-related task for the CMA is to implement its own state aid policy outside the EU. All sector-focused regulatory bodies (excluding the media and financial services' regulators) should be replaced with a horizontal regulator.

Business support

Businesses – certainly the incumbents – do not always see the merits of tough competition policy regime, as part of its function if it is working effectively is to enable the churn in a dynamic economy that sees unproductive firms go out of business and more productive new entrants. Schemes to support businesses are perhaps a more welcome part of industrial strategy. There are important roles for government, including the provision of advice and information especially about export markets, financial support such as tax credits for R&D, and co-ordination and information exchange. An under-appreciated aspect may be management advice; recent research is strongly indicative of the importance of the quality of management for productivity outcomes.[177] The UK typically under-values this aspect of industrial policy; there is some evidence that the centralisation of science and innovation policy in the UK may have contributed to an emphasis on large firms already operating at the technological frontier, at the expense of broad-based process and management innovation.[178]

We believe there is a need therefore for a robust set of business support policies and institutions, focused strategically on improving productivity, through, for instance, enhancing export capacity, the adoption of new technology, and ultimately enabling firms to move into new industries as supply chains evolve. Yet the landscape for supporting businesses to expand, export and grow has been subject to abrupt and poorly motivated changes in recent years. In England, the regional Business Link network of advisors was wound down by the coalition government in November 2011. This was replaced by the Business Growth Service in 2012, which incorporated the Manufacturing Advisory Service and the Growth Accelerator. Yet the Business Growth Service was discontinued with effect from March 2016, following the Autumn 2015 Spending Review[179], producing a saving of £84 million a year.

177 Bloom, N., Lemos, R., Sadun, R., Scur, D. and Van Reenen, J. (2014). 'The New Empirical Economics of Management', *National Bureau of Economic Research working paper 20102* http://worldmanagementsurvey.org/wp-content/images/2014/05/The-New-Empirical-Economics-of-Management-Bloom-Lemos-Sadun-Scur-and-Van-Reenen.pdf

178 Becker, B. Roper, S. and Love, J. (2017). 'The effectiveness of regional, national and EU support for innovation in the UK and Spain', *Research Paper No 52, Enterprise Research Centre*. https://www.enterpriseresearch.ac.uk/publications/effectiveness-regional-national-eu-support-innovation-uk-spain/

179 Pickard, J (2015) 'Key part of Cable's industrial strategy scrapped' *Financial Times* https://www.ft.com/content/c49773c4-9e90-11e5-8ce1-f6219b685d74

Currently, business support in England is delivered through a network of 39 'growth hubs' run by Local Enterprise Partnerships (LEPs), which was in place by May 2016[180], with total funding of £24 million over two years. It is too early to judge whether this radical decentralisation and reduction of resources assigned to business support has produced a more effective service. Their performance is almost certainly variable but we endorse the premise of support being delivered close to the ground and for schemes to be designed by local policymakers and institutions. We recommend that, as this programme is monitored, particular attention should be given to the question of the degree to which it has supported exporting firms, and that the metrics that the programmes are judged against prominently include measures of the value of new exports attributable to this support. Too often, local authorities evaluate the success of business support (somewhat tenuously) in terms of jobs created or safeguarded. These are important goals for individual local economies, but do not add up to a strategic framework for supporting productivity – which would improve economic resilience for all parts of the country.

There are also serious questions to be asked about materiality: £24 million over two years is clearly insufficient to have an identifiable impact on the economy – indeed, we can say the same about the previous annual spend of £84 million. The current arrangements suggest tokenism, adopted in the context of messy devolution arrangements. It is also worth mentioning the British Business Bank (BBB) and other government sources of investment at this point, which are focused on improving access to finance for firms in local economies, and which were discussed in Chapter Six. In 2016/17 the Bank made new commitments of £717 million and increased its stock of finance from £7.5 billion to £9.2 billion.[181] However, there is little evidence that the BBB is concerned with offering meaningful business support on the scale recommended here. Generally speaking, business financing, advice and support functions should be operating in a much more joined-up manner, albeit with local services shaped according to particular local needs and preferences, to better enable strategic interventions in support of high-value industries. This would include existing services related to trade finance.

The devolved nations offer lessons for England in this regard. Scottish Enterprise and Business Wales act as umbrellas and a first port of call for businesses in their nations. Finance Wales became the Development Bank of Wales in October 2017.[182] The Scottish government has also recently announced plans for a Scottish National Investment Bank providing patient capital investment for Scottish firms.[183] In Northern Ireland, Enterprise Northern Ireland was established in 2000 to represent 28 local enterprise agencies across Northern Ireland.[184] Invest NI is the regional business development agency established in 2015 to provide support to business finance.[185]

We would not favour yet another reorganisation of business support services in England for the sake of tidiness, but there is certainly a case for an assessment of the different organisational models, including international examples. The current review of LEPs being conducted by BEIS should take this into consideration. The UK's long-term trade weakness and unusual proliferation of low productivity firms suggest that policy in this area could learn a lot from examples overseas. Enterprise Ireland, for instance, created in 1998 out of a merger of predecessor bodies, was also suggested to the Commission as a good model of a single business support body.

180 Department for Business, Innovation and Skills press release (2016) 'Full network of 39 growth hubs boost business support across the country' https://www.gov.uk/government/news/full-network-of-39-growth-hubs-boost-business-support-across-the-country

181 British Business Bank (2017) *Annual Report and Accounts 2017* https://annualreport2017.british-business-bank.co.uk/

182 Finance Wales press release (2017) 'UK's first Development Bank to open in October in Wales' http://www.financewales.co.uk/news-and-features/news/2017/development-bank-of-wales.aspx

183 See the First Minister's Statement to the Scottish Parliament, 5 September 2017: https://news.gov.scot/speeches-and-briefings/2017-18-programme-for-government

184 For further information see: https://www.enterpriseni.com/about-enterprise-northern-ireland

185 For further information see: https://www.investni.com/index.html

We further suggest that growth hubs engage with the new 'Be the Business' initiative which has been established by the Productivity Leadership Council. The initiative allows businesses across the UK to connect and collaborate with each other through new online tools. Businesses are provided with new tools to their productivity and performance and benchmark themselves against other companies by region, sector or size to enable them to identify their weaknesses and opportunities. We endorse this approach and believe that information sharing is an essential part of providing effective business support.[186]

Recommendations: The new industrial strategy must encompass a serious commitment to business support, with advice focused on enabling firms in high-value industries to emerge and grow – and shaped by overarching industrial strategy objectives. Business support should be joined-up with other services, such as innovation and export finance. There will clearly be a need for better co-ordination between national and local services and institutions: the new Office for Strategic Economic Management should certainly consider how to rationalise the policy and delivery landscape, based on evidence of best practice internationally.

186 For further information see: https://www.bethebusiness.com/

8. Enabling growth everywhere

The extraordinarily high degree of regional imbalance in the UK's economy has been stressed throughout this report. This is now a major drag on the performance of the whole UK economy, with deleterious effects on productivity and fiscal balance. The political consequences of a lack of perceived equity are now apparent.

We have referred at several points in a number of different contexts to the strong forces that amplify already existing patterns of regional advantage and disadvantage – the 'Matthew effect', which makes the rich richer and the poor poorer. What is required is a systematic effort to identify explicitly these forces, to question whether this amplifying effect is what was intended, and when the consequences were indeed unintended, to redesign the process or devise countervailing interventions.

Industrial strategy is not the same as an agenda that focuses purely on inclusive growth; long-term innovation-led growth and productivity improvements are its key aims. In some cases the most cost-effective interventions to drive up overall national economic performance will also have the effect of reducing regional economic imbalances – this is probably the case for actions which unlock some of the under-exploited potential of our cities outside London.

But there will also be times when there is a trade-off between economic efficiency and the equitable treatment of communities. Sometimes, in these cases, the fairness objective should predominate.

The test of an industrial strategy should not be the unrealistic one, that regional inequalities are entirely abolished. Specific interventions may need to be concentrated in a few places, to avoid the 'jam-spreading' problem. But it is important that in all parts of the country we are able to identify new policies emerging from industrial strategy that produce material change to the specific circumstances of that particular place.

An industrial strategy should not seek to do everything everywhere, but it should seek to do something for everywhere. There should be nowhere where industrial strategy makes no impact at all, even if the requirement to focus means that some places receive more attention than others.

In this chapter we try to make this discussion concrete, by considering how the measures we propose would make a visible difference to people in places all across the country. All economically underperforming places underperform in different ways and have their own particular issues, but as we discussed in Chapter One we find it helpful to use a three-fold classification:

- Our economically underperforming regional cities. Cities like Birmingham or Belfast, Southampton or Glasgow, do not make the contribution to national productivity that they could do.
- De-industrialised urban areas, sometimes on the peripheries of larger cities. Places like Barnsley or Burnley, Dudley or Merthyr Tydfil have never recovered from 1980's de-industrialisation, and are now locked into a bad equilibrium where a combination of poor skills, poor infrastructure, low investment, and intractable social problems lead to weak productivity growth.
- The rural and coastal fringes of the UK, which include some of the least productive and poorest parts of the country. Towns like Market Rasen in Lincolnshire, Coleraine in Northern Ireland or Wisbech in the Fens provide too few opportunities for their young people, are disconnected from major poles of economic growth through poor transport infrastructure, poor mobile and broadband coverage, and often have public services that underperform.

Recommendation: Industrial strategy should seek to help all underperforming areas. In 5 or 10 years' time we should be able to pick any place in the UK and demonstrate how the industrial strategy has helped that place, its people and industries.

Institutions and infrastructure

The biggest effect of new political institutions will be seen in the UK's regional cities. We call for further and faster devolution from the centre to our towns, cities and regions. Local knowledge and perspectives can be put to the best use to unlock the barriers to greater productivity growth if delivery, policymaking and budgetary powers are significantly devolved. This will enable places to adapt the overall national industrial strategy framework to build on local specialisms and tailor solutions appropriate to their needs. City-regions like the West Midlands will have the capacity to design credible plans for economic growth. These will underpin ambitious plans for new infrastructure, which will satisfy new investment criteria taking into account the non-incremental economic changes that arise from the unlocking of agglomeration benefits.

The scale of the total populations in these areas means that significant increases in GDP per person will translate into a material overall contribution to national GDP growth.

Meanwhile deindustrialised areas such as Bolton, which are on the fringes of the new metro areas, will find that their issues become more politically salient. The stronger political accountability felt by the metro-mayors will give these places a bigger voice in local decision-making.

In the rural and coastal peripheries, places like Lowestoft will benefit from the commitment to a Universal Basic Infrastructure. Although the primary justification of the Universal Basic Infrastructure is fairness and national solidarity, there will be economic benefits too. A focus on modern infrastructure promoting connectivity, such as fibre broadband, will help new and existing businesses, while the Universal Basic Infrastructure will guarantee the quality of public services like health and social care to citizens. Because foundational economy activities such as health and social care are so important in these places, improvements in productivity in this sector would both benefit these individual places and have an impact on the UK's overall productivity.

Promoting innovation and high-value industries

Those regional cities that are beginning to develop successful clusters will be able to build on their growing local specialisms and support them by further investment and infrastructure. This will be informed by better analysis of local and regional strengths, with a national view of relative comparative advantages of different regions laid over these regional plans to avoid duplication and 'jam-spreading'. For example, the growing media cluster in Salford in Greater Manchester would be boosted by the relocation of Channel 4 to the city.

As the aspiration to raise the R&D intensity of the UK economy is realised through new structures such as UK Research and Innovation, further exacerbation of the existing strongly uneven distribution of R&D spending, both public and private, will be avoided, while maintaining the principle of supporting excellence. Institutions to support innovation and skills – including members of the Catapult Network like the Advanced Forming Manufacturing Centre, near Paisley, will improve the productivity of the existing business base and attract new inward investment and new business growth.

Many places outside the centres of our cities will benefit from these growing clusters, driven by initiatives in skills and innovation. For example, Barnsley and Rotherham will see increasing economic benefits from the growing high-value manufacturing cluster in Sheffield based around the Advanced Manufacturing Research Centre.

The need to ramp up investment in research development and deployment in energy may be a particularly important example here. The existing poles of R&D are in London, the East and South East, yet the natural locations for new clusters in offshore wind power, new nuclear, and carbon capture and storage are all likely to fall in Humberside and East Yorkshire, in Somerset and Cumbria.

Our call to refocus the health and social care system on innovation offers many opportunities to develop new, high-value, businesses across the country. There is a current glaring mismatch between the places where biomedical research is concentrated and where the greatest population health needs exist, and new clusters driven by research and innovation in new areas of data driven medical technology will grow in cities and regions outside London, the East and South East, driven by the location of the greatest patient needs and the opportunities arising from closer integration of health and social care.

There is a strong local and regional dimension to investment and business support; we need to support local mechanisms for investment, while not shielding regional businesses from the beneficial effects of competition. Business support will benefit from a more policy environment, particularly in the English regions. As business financing, advice and support functions become more joined up, the strengths and needs of each locality will be better recognised, and we will see higher levels of investment in currently underperforming cities and regions.

Metrics

We have already observed that the poor quality of regional statistics reflects the lack of importance placed on issues of regional growth by central government up to now.

In the next section, we recommend the establishment of an Office for Strategic Economic Management, amongst whose responsibilities will be monitoring the progress of industrial strategy. An assessment of the developing health of the local and regional economies will form a central part of these responsibilities, as we discuss in more detail in our final chapter.

There is currently research under way inside and outside government to understand the links between firms and regions in the economy at a much more granular level of detail than has been the case in the past, to gain insights into the supply chains and interactions that form the basis of long-term productivity and growth.[187] This approach to modelling complexity in the economy could deliver new insights into areas of strength and weakness, including connectivity or its lack. However, like the assessments just discussed, taking this work further will need to be supported by better, finer-grained statistics at the regional and sub-regional level. We discuss the need for better sub-national measurement in more detail in the next chapter; briefly, there is a need for accurate indicators of economic activity, government spending (including both capital investment and procurement), education and skills, and R&D and innovation activity.

Recommendation: The new Office for Strategic Economic Management should have an explicit mandate to monitor the health of local and regional economies, supported by improved data and statistics at regional and sub-regional level.

187 See for example: Arthur, W.B. (2013) 'Complexity Economics: A Different Framework for Economic Thought', *Santa Fe Institute Working Paper* http://tuvalu.santafe.edu/~wbarthur/Papers/Comp.Econ.SFI.pdf IPPR (2012) *Complex new world: Translating new economic thinking into public policy* https://www.ippr.org/publications/complex-new-world-translating-new-economic-thinking-into-public-policy

9. The Office for Strategic Economic Management

Previous chapters have set out many of the practical difficulties that must be faced as a new industrial strategy is developed. It is crucial that the policy framework that is adopted is monitored and measured effectively and that we simultaneously develop a policy culture and capacity to understand and use the subsequent data appropriately. This particularly applies to new and emerging organisations at both the national and local levels.

In Chapter Two we recommended the creation of a new independent expert body to monitor the industrial strategy and the effectiveness of its range of policy interventions and mechanisms, drawing a parallel with the Office for Budget Responsibility. This chapter outlines our thinking behind that recommendation in more detail. It considers why a new institution is needed, and focuses on what the remit and functions of the new institution we propose, the Office for Strategic Economic Management (OfSEM), should be.

As we have made clear industrial strategy requires a long-term policy approach. Strategic management of the UK economy to address the weaknesses of the economy and meet the goals of the state must be conceived and implemented as a long-term endeavour, over decades not months or years. As such it is essential that over decades the policy interventions of industrial strategy are monitored to ensure that progress is being made and maintained. It is not always possible to identify and address market and government failures in the short-term. A long view back and to forecast ahead is critical.

We further see long-term monitoring as an essential part of securing and maintaining political, business and public consensus for industrial strategy. 'What gets measured gets done' can be an overused phrase but there is a relevant truth underpinning it. A new body monitoring industrial strategy outcomes will make it harder for industrial strategy to be marginalised within government.

Function

Performing a role similar to the Office for Budget Responsibility (OBR) the primary function of the new institution we propose, the Office for Strategic Economic Management (OfSEM) would be to independently monitor and assess progress of the industrial strategy. As this report has consistently outlined we see industrial strategy as the strategic management of the UK economy and as such we believe conceiving a new institution as an 'Office for Industrial Strategy' would not be appropriate.

Whilst there are already a number of institutions such as the National Infrastructure Commission and the Productivity Leadership Group whose work relates to aspects of industrial strategy, none has a remit broad enough to effectively monitor the strategic management of the UK economy. Through its own internal analysis ability the only institution that could currently fulfil this role is the Treasury. However we believe a new institution, separate from the Treasury, is needed precisely to empower the Treasury. Its independent advice and recommendations would aid and lend weight to the work of the Treasury and the new industrial strategy division within it that we also propose.

Like the OBR, OfSEM should establish its own evidence base, choose appropriate indicators as well as developing horizon-scanning capabilities and a range of resources for policymakers to utilise. By publishing evaluations and evidence related to industrial strategy, we believe OfSEM would improve the standard of policymaking at the national, devolved nations, regional and local levels. It should also consider the effectiveness of sub-national strategies implemented by the devolved administrations, regional and local bodies, and as such it would be important for all areas of the country, as well as independent experts, to be represented in the new body's governance structure.

It should work closely with government and be equipped to undertake detailed investigations in response to requests from government. Like the OBR it should also be able to offer advice and to make recommendations to ministers and the government of the day. But industrial strategy is about policy choices, it is not a technocratic exercise, and so politicians must be free to endorse or ignore this advice. The monitoring body would ensure they are then held to account for any decisions that they make – or fail to make – which affect the economy.

The new office should therefore complement and aid rather than displace the government's industrial policy capabilities, and in particular those that we anticipate in the recommendation of a new industrial strategy division at the Treasury.

Policy is made by learning from experience, and so in establishing the remit of a new institution it is useful to consider comparable institutions elsewhere and how economic outcomes are monitoring and measured. As described in Chapter Two, there are a number of international comparators that are worth studying.

The Australian Productivity Commission

The Australian Productivity Commission was created in 1998, to replace the Industry Commission, Bureau of Industry Economics and the Economic Planning Advisory Commission. Consisting of a small number of commissioners served by a permanent staff, the Commission is independent and operates at arm's length from other government agencies. While the Government largely determines its work programme, the Commission's findings and recommendations are based on its own analyses and judgements. Its objectives, set out in legislation are to:

- Improve the productivity and economic performance of the economy.
- Reduce unnecessary regulation.
- Encourage the development of efficient and internationally competitive Australian industries.
- Facilitate adjustment to structural change.
- Recognise the interests of the community generally and all those likely to be affected by its proposals.
- Promote regional employment and development.
- Have regard to Australia's international commitments and the trade policies of other countries.
- Ensure Australian industry develops in ecologically sustainable ways.

The Commission reports formally through the Treasurer to the Australian Parliament, where its inquiry reports are tabled. However, with the statutory requirement to promote public understanding of policy issues, its reports and other communications activities are also directed at the wider community. The Commission's advice to government, and the information and analysis on which it is based, are open to public scrutiny. Its processes provide for extensive public input and feedback through hearings, workshops and other consultative forums, and through the release of draft reports and preliminary findings. The Commission produces four main streams of work:

- Public inquiries and research studies requested by government
- Self-initiated research and annual reporting on productivity, industry assistance and regulation
- Performance monitoring and benchmarking and other services to government bodies
- Competitive Neutrality Complaints

See https://www.pc.gov.au/ for further details

Swedish Agency for Growth Analysis

The Agency for Growth Analysis (established in 2009) is an agency instructed by the Swedish Government to evaluate and analyse Swedish growth policy. Its aim is to provide the government and other stakeholders in the growth policy process with an advanced knowledge base and recommendations to develop the state's work to promote sustainable growth and business development.

Its work focuses specifically on how the state can promote Sweden's innovation capacity, on investments to strengthen innovation capacity and on the country's capacity for structural transformation. The analyses and evaluations it publishes are forward-looking and intended for use in system development.

Growth Analysis works by government commission under the supervision of the Ministry of Enterprise and Innovation. Its commissions are designed in close dialogue with our clients in an annual analysis and evaluation plan. The agency takes a cross-government view and states that its primary target groups include the Ministry for Foreign Affairs, the Ministry of Education and Research and the Ministry of Finance, as well as other agencies carrying out commissions within growth policy. Whilst it is under government commission the Agency takes an independent position in its evaluations and analyses.

The Agency's work is based on three areas of activity: evaluations of growth policy initiatives; analyses of driving forces and processes in Swedish trade and industry, and the collection and production of economic statistics.

See http://www.tillvaxtanalys.se/in-english.html for further details.

South Korean National Economic Advisory Council

The National Economic Advisory Council (NEAC) acts as a consultative body for the President of South Korea and was established in 1999. The scope of NEAC activity covers national strategies and policies concerned with economic development, social welfare and international economic cooperation. There are 29 appointed council members from a variety of areas including academia, think-tanks, industry, and the media. Senior government ministers are also nominated to the Council. The NEAC is comprised of four subcommittees which focus on the macroeconomy and finance, welfare & employment, the innovation economy and a balanced economy The three main areas or 'pillars' of NEAC activities are:

1. Proposing economic agenda and policies
   - Diagnosing economic situation and assess the impacts of government policies
   - Recommending policy reforms to improve implementation in practice
   - Suggesting future agenda in response to structural changes in the domestic and global economy
2. Taking Initiatives for an economic innovation and paradigm shift
   - Suggesting policies agenda for a creative and business-friendly ecosystem
   - Analysing challenges and opportunities for improving national competitiveness
   - Facilitating collaboration among government agencies and building strong public-private partnerships
3. Promoting effective communication with the industry and the general public
   - Enhancing public understanding of the purpose and impacts of the government policy and gathering feedback from related experts about specific economic issues
   - Co-operating with international agents or overseas think-tanks to exchange views on the global economic agenda
   - Receiving feedback from field studies from sites such as industrial parks and social welfare agencies in order to improve policy systems

See http://www.neac.go.kr/en_tmp for further details

Drawing on the Australian, Swedish and South Korean examples provides useful guidance for a new UK institution. Ultimately it would be for the government of the day to design a new institution however we suggest that the Office for Strategic Economic Management should have the following functions and remit:

- The UK's monitoring body must be adequately resourced and authentically independent, and clearly focused on evaluating government policy as well as analysing the economic environment in which industrial strategy operates.
- Its advice should generally be open to public scrutiny – but it should also be able to provide private advice to government. It should seek to engage widely with business and sub-national institutions.
- Governments should be free to commission the new institution with specific questions and tasks that it wants to be assessed. Special commissions should be long-term and reflective in nature. Commissions should focus on big structural issues in the economy and not seek to provide immediate reactions to new economic data.
- It should take a long-term forward-looking approach and focus on assessing the UK's innovation capacity and on the country's capacity for structural transformation. It should provide a long-term assessment of the trajectory of the global economy and its drivers and how the UK can capitalise on the opportunities presented.

Recommendation: The new Office for Strategic Economic Management should focus on evaluating government policy over the long-term, and on analysing the economic environment in which industrial strategy operates. It would provide independent advice to government and carry out specific commissions on behalf of government.

Metrics

Once established, the first key task for the Office for Strategic Economic Management (OfSEM) would be to develop and agree metrics that it will monitor. For it to effectively assess industrial strategy outcomes at the national, local and sectoral levels and over the long-term it will be essential that key metrics are agreed with the government, and with the range of local and regional, private sector and intermediary institutions involved in the delivery of a new strategy.

We do not want to be overly prescriptive but it is clear that any new independent monitoring institution should design its metrics by considering economic data that relate to meeting the strategic goals of the state.

The BEIS Select Committee recently recommended a 'set of clear, outcomes focussed metrics that can be used to frame goals and to measure progress'.[188] They suggest the following:

- Improving real terms earnings per household and closing regional disparities
- Reducing differential GDP per head between least and best performing nations and regions
- Improving UK productivity relative to comparator economies and closing the gap with G7 average
- Improving UK Gross Domestic Expenditure on R&D relative to comparative OECD economies
- Improving UK investment in fixed capital relative to comparable OECD economies
- Improving the UK's position in international rankings on basic skills

188 House of Commons Business, Energy and Industrial Strategy Select Committee (2017) *Industrial Strategy: First Review*, Second Report of Session 2016-17 https://publications.parliament.uk/pa/cm201617/cmselect/cmbeis/616/616.pdf

- Improving the UK's position in international rankings on infrastructure
- Ensuring emissions remain within Carbon Budgets and legal limits for air pollution
- Closing the UK trade deficit
- Improving the proportion of businesses which scale up

Whilst we think the first key task for OfSEM would be to develop and agree its own metrics we agree with the Select Committee on the broad approach of these indicators.

The guiding mantra for designing new metrics, and ensuring that they remain effective over the long-term, must be for officials to 'get their shoes dirty' to develop their own knowledge of the UK economy.[189] In doing this it may become apparent that new datasets are required, and for existing data to be improved, in order to effectively monitor industrial strategy outcomes and ensure there is relevant, accurate and timely comparative data across countries, cities and regions on the key metrics. Furthermore, the cross-cutting goals of industrial strategy will not necessarily fit neatly with existing methodologies and sector, as currently defined and so new approaches may be required.

One key task for OfSEM would be to work with the Office for National Statistics (ONS) on sector classifications. We believe that our current sector classification is too rigid and defined by a view of sectors that doesn't reflect today's economy (and its future trajectory) with many categories increasingly irrelevant. A new strategy should move beyond the sector approach to reflect today's business models by analysing whole value chains, judging interventions by how effectively they can support the highest value-creating activities in existing and emerging industries.

Once the metrics are agreed the Office for Strategic Economic Management should present its evaluations in a clear and accessible way.

Recommendation: The first key task of the new office would be to develop and agree the metrics that it will monitor. Metrics should be designed by considering economic data that relate to meeting the strategic goals of the state.

Reporting

We suggest that the Office for Strategic Economic Management publishes a summary assessment of its key overarching indicators on an annual basis, but only publishes in-depth analysis on a four or five-year basis and only once within a parliament. Given our call for policy stability and the long-term approach needed for industrial strategy, and whilst it is important that key indicators are monitored continuously and with some data published annually, we do not think a full annual update would be helpful.

The BEIS Select Committee has recommended 'a single dashboard of metrics relating to Industrial Strategy on GOV.UK which should be updated as new statistics are published'.[190] A single dashboard presenting key metrics could prove useful, however we would caution against data being presented with an annual 'scorecard-style' approach. This could encourage short-termist policy interventions to achieve 'quick wins' ahead of the next assessment in a year's time.

189 O'Connor, S. (2016) 'The best economist is one with dirty shoes' *Financial Times* https://www.ft.com/content/07d4e7c6-4d90-11e6-88c5-db83e98a590a

190 House of Commons Business, Energy and Industrial Strategy Select Committee (2017) *Industrial Strategy: First Review*, Second Report of Session 2016-17 https://publications.parliament.uk/pa/cm201617/cmselect/cmbeis/616/616.pdf

It will be important for the country's national legislature to be meaningfully involved in scrutinising the government's work on industrial strategy. As such OfSEM should report to Parliament. We recommend it give formal evidence annually to Parliament, principally via the BEIS Select Committee in the House of Commons and the Economic Affairs Committee in the House of Lords. We also recommend that it reports to the devolved national assemblies.

Recommendation: The new Office should publish in-depth analysis of the industrial strategy on a four or five-year basis and only once within a parliament. It should provide a summary assessment of its key overarching indicators on an annual basis, and report this to Parliament and the devolved national assemblies.

Better sub-national measurement

As each of the chapters in this report have shown, the need for improving economic performance across and within regions is particularly pressing. But matching the need for better policy interventions at the local level is the need for better local and regional data and the capacity to understand and act on it. The range of problems, challenges and policy interventions set out in previous chapters are assessed on the basis of sometimes incomplete or partial data and over time, the improvement of data and statistics is as important as any of the new policy measures and institutions we recommend.

The inadequacy of sub-national statistics is not just a problem at the national level, but is acutely felt at the local and regional level too. Combined Authorities and city-regions need to monitor economic growth at the appropriate spatial levels so that the outcomes of their policies and decisions are clear, and so their voters can hold them to account. It is highly revealing about the centralisation of policy in this country over the course of the past century that the measurement of economic and social outcomes at anything below the national level has atrophied. While this is changing now, not least because of the devolution to the UK's nations and now to English city-regions, it adds to the immediate challenge for effective industrial strategy.

A key objective therefore for OfSEM will be to establish a set of core metrics that includes comprehensive national and regional data on aggregate output measures as well as a raft of complementary indicators that make up for some of the shortcomings of the headline indicators. The relationship between OfSEM and the ONS and the UK Statistics Authority will be crucial, as it will be with a range of data-producing organisations including the Devolved governments in Scotland, Wales and Northern Ireland and emerging city-regions in England. Other government agencies whose function is relevant to industrial strategy (UKRI, Innovate UK, the Office for Students, Higher Education Statistics Agency and Education and Skills Funding Agency) must also be tasked to collect, report and share data with OfSEM about the agreed metrics at the appropriate spatial and sectoral levels.

One key question is whether it is better to look for a single indicator – an improved version of GDP at the city-region level, adjusted to take account of the distribution of economic opportunities – or for a small number of indicators. The trade-off is that the latter approach provides more useful information, because there is more than one dimension to a successful economy; but it is easier for public debate to focus on a single number, if one can be found to overcome sufficiently the shortcomings of the current single number, GDP, or Gross Value Added (GVA) in the context of the city-region.

The success of the economy at the national level has long been seen in terms of growth in GDP, but the drawbacks of the focus on this number have become clearer.[191] Some of these shortcomings are all the more severe when the lens of inclusive growth is applied to the statistics. Critics point out that GDP omits a large amount of valuable but unpaid labour, especially child care and work in the home. Another key omission from GDP is the cost of economic growth in terms of its impact on the environment, either short-term effects such as pollution, or longer term damage to natural assets, such as reduced biodiversity, the loss of green spaces in cities, the depletion of water tables or the removal of natural flood defences such as marshy flood plains. All of these forms of natural capital are vulnerable to the demands of development, which boost short-term growth at the expense of the future.

Natural capital is one of the only forms of capital to which those with nothing else have access; at least we should know whether they are breathing more polluted air and have next to no access to nature. Public infrastructure capital is also important, for the same reason, and again the distribution of access to these assets for lower income households.

Finally, GDP was a measure of the aggregate economy devised for the age of mass production manufacturing. The character of the economy has changed greatly. It is now largely based on services. New types of business are being enabled by digital technologies. The nature of work has been changing. One problem is that the categorisation of occupations and industrial sectors dates from a time when manufacturing was far more important. There is fine detail for different occupations or sub-sectors in manufacturing, but broad-brush categories for services. We do not know how many people are working in the 'sharing economy' businesses. People working on software development or video games or social media marketing could select various high-level categories to describe their job. The GDP total is itself affected by difficulty in accounting for the value people get from free digital services, and by changes in business models such as the bundling of services, which makes it tricky to calculate the price index and therefore real growth.[192]

The overall picture in terms of understanding the economy at the regional or city-region level is of a paucity of regional up-to-date statistics in general. Within that, there is less information on distribution. The annual publication gives a figure for average GVA per capita. Yet this is not a meaningful indicator of how growth is being shared for two reasons.

The first is that many people commute into and out of cities. GVA per capita mixes together workers and residents; many city centres have high GVA per capita because of the work done by commuters but also have many people on low incomes living in them. The GVA per hour worked figures used above are a good indicator for thinking about productivity but not about living standards. One alternative for the latter is to look at the evolution of income per household. At the regional level, London and the South East again top the chart, and London has been accelerating away from other regions for most of the past 20 years. However, as we noted in Chapter One, it is important to acknowledge the wide income inequality within London and the high level of deprivation in some parts of the capital.

Recommendation: To effectively monitor and measure the new strategy improved sub-national economic data is required. OfSEM should work with the relevant data-producing national organisations, and local and regional institutions to agree metrics at the appropriate spatial and sectoral levels.

191 Coyle, D (2014) *GDP: A Brief But Affectionate History*. Princeton: Princeton University Press; Bean, C (2016) *Independent Review of Economic Statistics: Final Report, 2016*. https://www.gov.uk/government/publications/independent-review-of-uk-economic-statistics-final-report

192 Coyle, D (2015) 'Modernising Economic Statistics: Why It Matters,' *National Institute Economic Review*, No. 234, F4-F7 http://journals.sagepub.com/doi/full/10.1177/002795011523400108

Regional resilience indicators

As discussed, the Office for Strategic Economic Management will need to help build an up to date picture of regional indicators to assess the health of local and regional economies. It would therefore provide resources and advice for policymakers both nationally and locally to utilise. Their analysis of the statistical information should not just take into account the most recent release of data but also assess the resilience of the region to shocks over time, these could be global (the financial crisis of 2008), national (the UK house price crash of the early 1990s) or local (the closing of a factory) in nature. In practice empirical data is only available for regional economies over relatively short time horizons but taking into account how the economy has recovered from the 2008 recession would be a useful exercise for the UK.

The resilience of regions to withstand economic shocks has been gaining prominence in the academic literature.[193] Since the financial crisis of 2008 some UK regions have rebounded strongly but others have been slow to recover and suffered further falls in employment.[194] The resilience of the local business cycle is of interest to central government policymakers, and at the sub-national level to businesses, LEPs and to devolved administrations as they use the economic levers at their disposal to mitigate the impact of economic downturns.

Professor Ron Martin defines four interrelated dimensions of resilience that are necessary for describing how a regional economy responds to a recessionary shock.[195] The first is resistance which is the sensitivity of a region compared to the nation during the recession, second is the speed and extent of recovery from the recession, and third is if the region goes through structural re-orientation and what implications this has for the region's jobs, output and income. The fourth dimension is the degree of renewal a region will undergo following the shock. We would encourage OfSEM to consider regional resilience as part of their analysis of sub-national economic indicators.

Recommendation: New sub-national economic indicators should give consideration to measuring the resilience of local and regional economies.

193 Martin, R.L. (2012) 'Regional Economic Resilience, Hysteresis and Recessionary Shocks', *Journal of Economic Geography* 12(1), 1–32, https://doi.org/10.1093/jeg/lbr019 Martin, R.L. and Sunley, P. (2015) 'On the notion of regional economic resilience: conceptualization and explanation', *Journal of Economic Geography* 15(1), 1–42, https://doi.org/10.1093/jeg/lbu015

194 Sensier, M. and Artis, M. (2016) 'The Resilience of UK Regional Employment Cycles ', *Centre for Growth and Business Cycle Research Discussion Paper Series, University of Manchester, No. 229* http://hummedia.manchester.ac.uk/schools/soss/cgbcr/discussionpapers/dpcgbcr229.pdf

195 Martin, R.L. (2012) 'Regional Economic Resilience, Hysteresis and Recessionary Shocks', *Journal of Economic Geography* 12(1), 1–32.

Appendix A: The Commissioners

Dame Kate Barker (Chair)

Kate Barker was an external member of the Bank of England's Monetary Policy Committee between 2001-2010 and is a former Chief Economic Adviser at the CBI. She has conducted major independent policy reviews for the UK government on Housing Supply and Land Use Planning. She now works primarily in a range of non-executive and trustee roles. In 2017 she was appointed as a Commissioner of the National Infrastructure Commission.

Dr Craig Berry

Craig Berry is the Deputy Director of the Sheffield Political Economy Research Institute (SPERI) at the University of Sheffield. Craig's research specialises in UK economic policy, finance, manufacturing and pensions. Craig was previously a policy adviser on state pensions and older people at the Treasury, Pensions Policy Officer at the Trades Union Congress, and Head of Policy and Senior Researcher at the International Longevity Centre-UK (ILC-UK).

Professor Diane Coyle

Diane Coyle is Professor of Economics at The University of Manchester and co-director of Policy@Manchester. Diane is the founder of Enlightenment Economics, a Fellow of the Office for National Statistics and a member of the Natural Capital Committee. She was Vice-Chair of the BBC Trust between 2006-2015, a member of the Migration Advisory Committee between 2007-2012 and a member of the Competition Commission between 2001-2009.

Professor Richard Jones

Richard Jones is Professor of Physics at the University of Sheffield and a Council Member of the Engineering and Physical Sciences Research Council. From 2009 to 2016 he was Pro-Vice Chancellor for Research and Innovation at the University of Sheffield. He is an Associate Fellow of SPERI and a Fellow of the Royal Society. Richard is an experimental physicist specialising in nanotechnology and soft matter, who has also written extensively on science, innovation, productivity and economic policy.

Professor Andy Westwood

Andy Westwood is Professor of Government Practice and Vice Dean of Humanities at The University of Manchester. He is a Visiting Professor of Further and Higher Education at the University of Wolverhampton. Andy has worked as an expert adviser to the OECD and the IMF and has held senior roles at The Work Foundation, the Centre for Economic and Social Inclusion and GuildHE as well as working as an adviser within various government departments.

Tom Hunt, Policy Research Officer at the Sheffield Political Economy Research Institute (SPERI), has managed the work of the Industrial Strategy Commission. Tom managed the evidence gathering and engagement activities of the Commission, contributed to the Commission's reports and oversaw their production.

Dr Marianne Sensier, an economist at The University of Manchester, has provided research support to the Commission.

Appendix B: Evidence and engagement

Through 2017 the Commission has conducted its evidence gathering and engagement with stakeholders in a variety of ways.

Written evidence

An open call for evidence was made between February and May. Over 80 individuals and organisations shared written evidence with the Commission. The full list of submissions is provided below.

Evidence sessions

A range of public and private evidence sessions were held in London, Birmingham, Sheffield, Manchester and Cambridge. Evidence sessions explored challenges and opportunities for industrial strategy across a range of policy areas and themes including health and social care, Industry 4.0, place-based industrial strategy and advanced manufacturing.

Private meetings and interviews

A number of private interviews were conducted with senior industry, academic and central government stakeholders.

Meetings were also held with key stakeholders in the Department for Business, Energy and Industrial Strategy, the Department for Communities and Local Government and HM Treasury.

Submissions of written evidence

John Alexander

David Bott, Warwick Manufacturing Group

Adrian Bowyer, RepRap Ltd

BPI (British Recorded Music Industry) Ltd

British Chambers of Commerce

British Cryogenics Council

The Business Services Association

Campaign Against Arms Trade (CAAT)

Catapult Network

The Centre for Economic Performance, London School of Economics

Centre for Research on Socio-Cultural Change (CRESC), The University of Manchester

The Centre for Urban and Regional Development Studies (CURDS), Newcastle University (submission by Peter O'Brien, Stuart Dawley, Danny MacKinnon, Andy Pike and John Tomaney)

Martin Chick, University of Edinburgh

CityFibre

City REDI, Birmingham Business School, University of Birmingham

Nicholas Comfort

Common Futures Network

Confederation of British Industry

David Connell

Core Cities

Dan Corry and Peter Kenway, New Policy Institute

Council for Higher Education in Art & Design (CHEAD)

Nicholas Crafts, University of Warwick

Terry Critchley

Dalton Nuclear Institute, The University of Manchester

David Dodds, The Centre for Urban and Regional Development Studies (CURDS), Newcastle University

Doteveryone

Ciaran Driver, SOAS School of Finance & Management, and Paul Temple, University of Surrey

Ernst & Young

Kieron Flanagan, The University of Manchester, and James Wilson, the University of Sheffield

Alison Fuller and Lorna Unwin, UCL Institute of Education

General Electric

Geological Society

GuildHE

The Health Foundation

Heart of the South West Local Enterprise Partnership

Dieter Helm

Alan Hughes, Lancaster University Management School and Imperial College Business School and Martin Spring, Lancaster University Management School

David Hughes, The Business Innovation Group LLP

Faculty of Humanities, The University of Manchester

Paula Hyde, Alliance Manchester Business School, The University of Manchester

Inclusive Growth Analysis Unit (IGAU), The University of Manchester

Industrial Communities Alliance

IPPR North

Joseph Rowntree Foundation

Julie Kasmire and Frank Boons, Sustainable Consumption Institute, Alliance Manchester Business School, The University of Manchester

Ryan Khurana

John Kingman

LearnDirect

Legacy Park Ltd

Magnomatics Limited

The Manchester Institute of Innovation Research, Alliance Manchester Business School, The University of Manchester

Ron Martin, University of Cambridge

Medilink UK

Midlands Chambers' of Commerce

MillionPlus

Minerals Product Association

Valbona Muzaka, Kings College London

Natural Environment Research Council

New Economics Foundation

Open Data Institute

Nicholas Oulton, London School of Economics

Hugh Pemberton University of Bristol

Carlota Perez, London School of Economics

Simon Reddy, Chartered Institute of Plumbing and Heating Engineering

RenewableUK

Dani Rodrik, Harvard Kennedy School

The Royal Society

Russell Group

The Schumacher Institute

Scientists for Global Responsibility

Marianne Sensier, The University of Manchester

Sheffield City Region LEP and Combined Authority

Siemens UK

Andrew Smithers

Spatial Policy & Analysis Laboratory (SPA-Lab), Manchester Urban Institute, The University of Manchester (submission by Mark Baker, Iain Deas, Vincent Goodstadt, Stephen Hincks, Brian Robson, Andreas Schulze-Baing, and Cecilia Wong)

Tidal Lagoon Power

Tomorrow's Company

Trades Union Congress (TUC)

Tyndall Centre for Climate Change Research, The University of Manchester

Unions 21

Unite

Universities UK

University Alliance

Geoff White and Mark Matthews

Iain Wicking, Quadrigy Australia

Graham Winch, Alliance Manchester Business School, The University of Manchester

Mark Woodward, Community Works

Ian Wray

The Industrial Strategy Commission

The Industrial Strategy Commission

contact@industrialstrategycommission.org.uk

industrialstrategycommission.org.uk